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PENSOFT

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Generic and family transfers, and *nomina dubia* for orb-weaving spiders (Araneae, Araneidae) in the Australasian, Oriental and Pacific regions

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Abstract

As part of a current revision of the Australasian and Pacific orb-weaving spider fauna (family Araneidae Clerck, 1757), a number new combinations are proposed in the genera *Acroaspis* Karsch, 1878 (3 species), *Carepalxis* L. Koch, 1872 (1 species), *Cyclosa* Menge, 1866 (5 species), and *Neoscona* Simon, 1864 (7 species): *Acroaspis lancearia* (Keyserling, 1887), **comb. n.**, *A. mamillana* (Keyserling, 1887), **comb. n.**, *A. scutifer* (Keyserling, 1886), **comb. n.**, *Carepalxis furcifera* (Keyserling, 1886), **comb. n.**; *Cyclosa anatipes* (Keyserling, 1887), **comb. n.**; *Cyclosa apoblepta* (Rainbow, 1916), **comb. n.**; *Cyclosa argentaria* (Rainbow, 1916), **comb. n.**; *Cyclosa lichensis* (Rainbow, 1916), **comb. n.**; *Cyclosa poweri* (Rainbow, 1916), **comb. n.**; *Neoscona decolor* (L. Koch, 1871), **comb. n.**; *Neoscona enucleata* (Karsch, 1879), **comb. n.**; *Neoscona flavopunctata* (L. Koch, 1871), **comb. n.**; *Neoscona floriata* (Hogg, 1914), **comb. n.**; *Neoscona granti* (Hogg, 1914), **comb. n.**; *Neoscona inusta* (L. Koch, 1871), **comb. n.**; and *Neoscona notanda* (Rainbow, 1912), **comb. n.**

The following two Australian species, currently placed in *Araneus*, are not Araneidae but comb-footed spiders (family Theridiidae Sundevall, 1833): *Anelosimus dianiphus* (Rainbow, 1916), **comb. n.** and *Theridion xanthostichus* (Rainbow, 1916), **stat. and comb. n.**

The following six species are considered *nomina dubia* as their type material is immature or otherwise unidentifiable (e.g. partly destroyed): *Araneus acachmenus* Rainbow, 1916; *Araneus agastus* Rainbow, 1916; *Araneus exsertus* Rainbow, 1904; *Araneus suavis* Rainbow, 1899; *Carepalxis coronata* (Rainbow, 1896); and *Heurodes turritus* Keyserling, 1886. *Heurodes fratellus* (Chamberlin, 1924) is considered a *nomen dubium* and *Heurodes porcula* (Simon, 1877) is returned to *Eriovixia* Archer, 1951, *Eriovixia porcula* (Simon, 1877).

Type material of predominantly Australian species described by E. v. Keyserling (1 species), W. J. Rainbow (10 species), A. T. Urquhart (8 species), and C. A. Walckenaer (2 species) is here considered destroyed or otherwise lost. As it is impossible to identify these species from their original descriptions and considering the known spider fauna from their respective type localities, they are all considered *nomina dubia*: *Anepsia crinita* Rainbow, 1893; *Epeira diabrosis* (Walckenaer, 1841); *Epeira diversicolor* Rainbow, 1893; *Epeira ficta* Rainbow, 1896; *Epeira hamiltoni* Rainbow, 1893; *Epeira lacrymosa* (Walckenaer, 1841); *Epeira leai* Rainbow, 1894; *Epeira mortoni* Urquhart, 1891; *Epeira notacephala* Urquhart, 1891; *Epeira obscurta* Urquhart, 1893; *Epeira phalerata* Urquhart, 1893; *Epeira pronuba* Rainbow, 1894; *Epeira rara* Keyserling, 1887; *Epeira singulara* Urquhart, 1891; *Epeira sub-flavida* Urquhart, 1893; *Epeira similaris* Rainbow, 1896 (= *Araneus urquharti* Roewer, 1942 replacement name); *Epeira ventriosa* Urquhart, 1891; and *Epeira viridula* Urquhart, 1891.

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Introduction

Generic transfers and synonymies

The genus *Araneus* Clerck, 1757 (and its junior synonym *Epeira* Walckenaer, 1805) has been used as a 'dumping ground' for many orb-weaving spiders (Araneidae Clerck, 1757) of uncertain affinities world-wide (e.g. Grasshoff 1983; Scharff et al. in press). Many of these species bear only a remote similarity to the type species of the genus, *Araneus angulatus* Clerck,1757 (see Kluge 2007). Recent taxonomic studies have rectified this undifferentiated picture for the Araneidae at least for parts of the Palaearctic (e.g. Grasshoff 1976) and for the New World (generic revisions in the Araneidae by Levi (1971; 1973; 1981; 1991a) and many other revisions by the same author). However, in other parts of the world, orb-weaving spiders still require extensive revision at the generic and species level. For example, Yin et al. (1997) listed six different 'groups' for the species of *Araneus* in China (*dehaani*-, *ejusmodi*-, *sturmii*-, *diadematus*-, *ventricosus*-, and *henanensis*- groups), most of which appear to warrant generic status. Confusion on the generic placement of these spiders is reflected in the fact that one of the nominal species of Yin et al.'s (1997) species-groups of *Araneus* is currently listed in *Parawixia* F. O. Pickard-Cambridge, 1904, *P. dehaani* (Doleschall, 1859), although molecular and morphological data suggest the species to be misplaced in both *Araneus* and *Parawixia* (Scharff et al. in press).

Almost 90 species of *Araneus* are currently listed for Australia and many more for adjacent biogeographic regions such as South-East Asia and the South Pacific (World Spider Catalog 2019). Many of these species have not been treated taxonomically since their original description. Levi (1991a) provided a detailed diagnosis and description of *Araneus*, which can be used to critically evaluate the validity of these species to be listed in the genus, and detailed investigations as part of a comprehensive revision of the Australian Araneidae suggested that true *Araneus* do not occur in Australia (see Scharff et al. in press). Davies (1988) already acknowledged the misplacement of Australian *Araneus*, as many of the local species within this genus have a paramedian apophysis on the male pedipalp (absent in true *Araneus*) and a single tibial spine on the pedipalp (two spines in *Araneus*) (e.g. Levi 1991a). About 30 putative new genera have been identified for Australia (V.W. Framenau & N. Scharff unpublished data; Scharff et al. in press) in addition to some that have recently been established as part of ongoing revisions of the Australian orb-weaving spiders (Framenau 2011; Framenau et al. 2010a; Framenau and Scharff 2009; Harmer and Framenau 2008; Joseph and Framenau 2012). The review of type material as part of this revisionary work also found that a number of Australian species currently listed in *Araneus* belong to well-established genera. For example, four Australasian *Araneus* were transferred to *Cyrtophora* Simon, 1864 (Framenau and Scharff 2009) and previously presumed Australian *Araneus* have been shown to belong to established genera of the American and New Zealand faunas (Framenau et al. 2009).

The main aim of this study is to transfer species currently listed in *Araneus*, but also some *Carepalxis* L. Koch, 1872 and *Verrucosa* McCook, 1888, to the correct currently recognised genera that occur in Australia and neighbouring regions, such as *Acroaspis* L. Koch, 1872, *Carepalxis*, *Cyclosa* Menge, 1866, and *Neoscona* Simon, 1864. Two species are transferred to a different family altogether, the comb-footed spiders (Theridiidae Sundevall, 1833). These transfers will allow consideration of these species in future revisionary work in relation to the respective genera, in particular within an Australian context, studies in which they would otherwise likely be overlooked. Similarly, for example, extensive evaluation of Australian type material allowed *Araneus mastersi* Bradley, 1876 to be considered in a recent study of Australasian Phonognathidae Simon, 1894 (*sensu* Kuntner et al. in press) (Kallal and Hormiga 2018). However, this current study does not aim to solve the taxonomic placement of those Australian species listed in *Araneus* that require the establishment of new genera and therefore many species of the Australian fauna remain listed in *Araneus* until these new genera are established.

Nomina dubia

For a large proportion of Australian Araneidae, including many in the genus *Araneus*, type material is problematic: either it only includes immature or poorly preserved specimens, or it must be considered lost as it could not be found during intensive investigations of museum collections as part of this study. This includes species described by W. J. Rainbow from Queensland and New South Wales and by A.T. Urquhart from Tasmania, in addition to Australian species described by Graf E. von Keyserling (mainly from the Bradley Collection), and those described by C. A. Walckenaer.

Between ca. 1893 and 1920, William J. Rainbow (1856–1919) published extensively on Australian spiders, but also described spiders from Papuan and Pacific regions (e.g. Rainbow 1897; 1898; 1899a; b). He was an entomologist at the Australian Museum in Sydney and most of his types are housed there or at the Queensland Museum, Brisbane. However, some types of selected works by Rainbow (1893; 1894; 1896a; b; 1912; 1916a; b) could not be located at these museums and are here considered lost. Arthur T. Urquhart (?–1919) was a New Zealand arachnologist who also published two papers on the Tasmanian spider fauna. However, none of Urquhart's (1891; 1893) types of Tasmanian species have been located at the Canterbury Museum, New Zealand, where all known types of the scientist are housed (Nicholls et al. 2000). Therefore, these types are considered lost (see also Paquin et al. 2008). Unfortunately, Urquhart's (1891) figure plate is missing in any of the copies of the article I could examine and his monotypic genus *Collina* Urquhart, 1891, type

species *C. glabicira* Urquhart, 1891, cannot be recognised by the verbal description alone (see also Kallal and Hormiga 2018). Rainbow's (1911) '*Census of Australian Araneae*' and Bonnet's (1955) '*Bibliographia Araneorum*' omitted all of Urquhart's (1891) Tasmanian species.

Species descriptions in '*Die Arachniden Australiens nach der Natur beschrieben und abgebildet*' (Koch and Keyserling 1871–1890), published by L. Koch (1825–1908) and Graf E. von Keyserling (1833–1889), were based on several collections, including that of Henry H. B. Bradley (1845–1918), a Sydney-based lawyer and naturalist who himself published on spiders (e.g. Bradley 1871; 1876). None of Koch and Keyserling's type specimens from the Bradley collection have been found and the collection seems to be lost (e.g. Framenau 2005). Charles A. Walckenaer (1771–1852), was based in Paris when he co-authored the "*Histoire naturelle des insectes. Aptères*" (e.g. Walckenaer 1841; Walckenaer and Gervais 1837) describing a number of Australian spiders from early collections (i.e. Quoy and Gaimard 1824), but the material on which his descriptions are based has frequently been reported lost. Koch (1871; p. VII) commented that Walckenaer's (from German) "quantitatively not insignificant material cannot be used in certain cases due to its inadequate condition".

Not all species with lost types are here designated *nomina dubia*. Some of Urquhart's species could be identified based on the original description; for example, *Aerea alticephala* Urquhart, 1891 and *A. monticola* Urquhart, 1893 were recognised as junior synonyms of *Arkys simsoni* (Simon, 1893) (Framenau et al. 2010b). Similarly, some of Rainbow's original descriptions were sufficient to allow an accurate species identification. Moreover, the original descriptions of *Araneus rubripunctatus* (Rainbow, 1893) and *Araneus sinuosus* (Rainbow, 1893) in combination with the type localities (both from Sydney) clearly identified these species as junior synonyms of *Plebs eburnus* (Keyserling, 1887) (Joseph and Framenau 2012).

In summary, the second aim of this paper is to critically evaluate the species descriptions of species of which type material is uninformative or presumed lost and, in combination with a detailed examination of the respective local fauna, to establish if they can be attributed to a known or undescribed species from collections. If not, they are considered *nomina dubia* here. Some scientists working on mainly the Australian fauna also published papers on spiders from neighbouring regions (e.g. Hogg 1914; Rainbow 1899b) and some of their type material was examined in the respective museums. Therefore, some taxonomic changes in the Araneidae from outside Australia are proposed here.

Methods

This study is based on a comprehensive investigation of more than 12,500 records of orb-weaving spiders representing more than 26,000 specimens from collections of all Australian museums and type material lodged overseas, in particular the Natural History Museum, London, the Centrum für Naturkunde (CeNak), Universität Hamburg (Germany), and the Museum für Naturkunde, Zentralinstitut der Humboldt-Universität, Berlin (Germany), where many of the historic types are housed. It forms part of an ongoing revision of the Australian Araneidae that commenced in 2005.

All designations of *nomina dubia* are based on either examination of type material or, in case of lost type material, a critical evaluation of the original description in combination with a consideration of spiders investigated from the respective region where the type material was found.

Some images of type material were taken during visits to the respective institutes with a very simple photographic setup through a tube of a stereomicroscope provided by the institute using an adapter and a Canon Rebel 300D digital camera. The reproductions of these photos here are not necessarily diagnostic at species level but serve to support the taxonomic decisions proposed here.

Species are treated in order of Table 1 and Table 2, generally alphabetical by genus and species, but in cases of *nomina dubia*, species with immature and damaged types are listed first, followed by those of which the types are considered lost.

Abbreviations: AM – Australian Museum, Sydney (Australia); BMNH – Natural History Museum, London (England); CMNZ – Canterbury Museum, Christchurch (New Zealand); MCSN – Museo Civico di Storia Naturale di Genova (Italy); ZMB – Museum für Naturkunde, Zentralinstitut der Humboldt Universität, Berlin (Germany); ZMH – Zoologisches Institute und Zoologisches Museum, Universität Hamburg (Germany), MNHN – Muséum National d'Histoire Naturelle, Paris (France).

Results

A total of 18 new combinations are here proposed within the Araneidae and Theridiidae, including 13 from Australia (Table 1). Thirteen species of *Araneus* (eight known from Australia) are transferred to *Acroaspis* (three species), *Cyclosa* (three species) and *Neoscona* (seven species), in addition to two species which are transferred to the Theridiidae. One species is transferred from *Verrucosa* to *Carepalxis*, thereby excluding the former genus from the Australian fauna; in turn, two species previously listed in *Carepalxis* are transferred to *Cyclosa* (Table 1).

A total of 22 species currently listed in *Araneus* (21 from Australia, one from the Solomon Islands) are considered *nomina dubia* (Table 2). In addition, one species each of *Carepalxis*, *Collina* and *Heurodes* Keyserling, 1886 (all from Australia) are considered *nomina dubia*. These taxonomic decisions are based on unidentifiable type material (five immature, one damaged) or type material considered lost (16 species). In total, twelve of W. J. Rainbow's species are considered *nomen dubia* (including *Araneus urquharti* (Roewer, 1942), a replacement name for *Epeira similis* Rainbow, 1896), nine of A. T. Urquhart, two of C. A. Walckenaer, and two of E. v. Keyserling (Table 2).

Table 1. Summary of proposed new generic combinations.

Species (with new combination)	Previous genus	Type locality/localities	Country
Araneidae			
Acroaspis lancearia (Keyserling, 1887)	*Araneus*	Sydney (New South Wales)	Australia
Acroaspis mamillana (Keyserling, 1887)	*Araneus*	Sydney (New South Wales)	Australia
Acroaspis scutifer (Keyserling, 1886)	*Araneus*	Sydney (New South Wales)	Australia
Carepalxis furcifera (Keyserling, 1886)	*Verrucosa*	Rockhampton (Queensland)	Australia
Cyclosa anatipes (Keyserling, 1887)	*Araneus*	Peak Downs, Rockhampton (Queensland), Palau	Australia, Palau
Cyclosa apobleta (Rainbow, 1916)	*Araneus*	Gordonvale (Queensland)	Australia
Cyclosa argentaria (Rainbow, 1916)	*Araneus*	Gordonvale (Queensland)	Australia
Cyclosa lichensis (Rainbow, 1916)	*Carepalxis*	Gordonvale (Queensland)	Australia
Cyclosa poweri (Rainbow, 1916)	*Carepalxis*	Narrabeen (New South Wales)	Australia
Neoscona decolor (L. Koch, 1871)	*Araneus*	Fiji	Fiji
Neoscona enucleata (Karsch, 1879)	*Araneus*	Sri Lanka	Sri Lanka
Neoscona flavopunctata (L. Koch, 1871)	*Araneus*	Fiji	Fiji
Neoscona floriata (Hogg, 1914)	*Araneus*	Setakwa and Utakwa Rivers (Indonesia)	Indonesia
Neoscona granti (Hogg, 1914)	*Araneus*	Setakwa and Utakwa Rivers (Indonesia)	Indonesia
Neoscona inusta (L. Koch, 1871)	*Araneus*	Bowen (Queensland)	Australia
Neoscona notanda (Rainbow, 1912)	*Araneus*	Blackall Range (Queensland)	Australia
Theridiidae			
Anelosimus dianiphus (Rainbow, 1916)	*Araneus*	Gordonvale district (Queensland)	Australia
Theridion xanthostichus (Rainbow, 1916)	*Araneus*	Gordonvale (Queensland)	Australia

Table 2. Summary of proposed *nomina dubia.*

Species (current combination)	Type locality	Country	Type material condition
Araneus acachmenus Rainbow, 1916	Gordonvale (Queensland)	Australia	immature
Araneus agastus Rainbow, 1916	Gordonvale (Queensland)	Australia	immature
Araneus exsertus Rainbow, 1904	Mornington Island (Queensland)	Australia	immature
Araneus suavis Rainbow, 1899	St Cruz	Solomon Islands	abdomen missing
Carepalxis coronata (Rainbow, 1896)	New England (New South Wales)	Australia	immature
Heurodes turritus Keyserling, 1886	Tasmania	Australia	immature
Araneus crinitus (Rainbow, 1893)	Manly (New South Wales)	Australia	considered lost
Araneus diabrosis (Walckenaer, 1841)	Port Jackson (Sydney)	Australia	considered lost
Araneus diversicolor (Rainbow, 1893)	Sydney (NSW)	Australia	considered lost
Araneus fictus (Rainbow, 1896)	New England district (New South Wales)	Australia	considered lost
Araneus hamiltoni (Rainbow, 1893)	Guntawang, near Mudgee (New South Wales)	Australia	considered lost
Araneus lacrymosus (Walckenaer, 1841)	Port Jackson (Sydney)	Australia	considered lost
Araneus leai (Rainbow, 1894)	Bungendore (New South Wales)	Australia	considered lost
Araneus mortoni (Urquhart, 1891)	Tasmania	Australia	considered lost
Araneus notacephalus (Urquhart, 1891)	Tasmania	Australia	considered lost
Araneus obscurtus (Urquhart, 1893)	Tasmania	Australia	considered lost
Araneus phaleratus (Urquhart, 1893)	Tasmania	Australia	considered lost
Araneus pronubus (Rainbow, 1894)	Bungendore (New South Wales)	Australia	considered lost
Araneus rarus (Keyserling, 1887)	Cape York (Queensland)	Australia	considered lost
Araneus singularis (Urquhart, 1891)	Tasmania	Australia	considered lost
Araneus subflavidus (Urquhart, 1893)	Tasmania	Australia	considered lost
Araneus urquharti (Roewer, 1942)	New England district (New South Wales)	Australia	considered lost
Araneus ventriosus (Urquhart, 1891)	Tasmania	Australia	considered lost
Araneus viridulus (Urquhart, 1891)	Tasmania	Australia	considered lost
Collina glabicira Urquhart, 1891	Tasmania	Australia	considered lost

Discussion

This study reduces the number of Australian species in *Araneus*, a genus that presumably does not occur in this country, by 35% from 87 (including 3 subspecies) to 56 (2 subspecies) species. However, it also shows the unsatisfactory taxonomic status within the Australian orb-weaving spiders, as for the remaining 56 *Araneus* species, new genera need to be established. Similarly, *Eriophora* Simon, 1864 (three Australian species) and *Parawixia* F. O. Pickard-Cambridge, 1904 (one Australian species) are unlikely to have true representatives in the Australian fauna as confirmed by multi-loci molecular data (Scharff et al. in press) (see also non-monophyly of *Araneus* and *Eriophora* in Kallal and Hormiga 2018). Both genera were originally described based on type material from the Americas (Levi 1970; 1992). A similar taxonomic legacy is still prevalent in many other Australian spider families, e.g. the wolf spiders (Lycosidae Sundevall, 1833) in which 17 species are currently placed in the

Mediterranean genus *Lycosa* Latreille, 1804 where they were originally placed by early European arachnologists (e.g. Framenau and Baehr 2016; Framenau and Leung 2013; Framenau and Vink 2001).

Three genera of orb-weaving spiders are eliminated from the Australian fauna, one based on a misplaced species (*Verrucosa*) and two now considered *nomina dubia* (*Collina* and *Heurodes*).

Taxonomy

Synonyms and generic and family transfers

Family *Araneidae* Clerck, 1757

Acroaspis Karsch, 1878

The genus *Acroaspis* was established primarily based on the unique shape of the carapace of the female, specifically the large height of the clypeus and the forward-facing four median eyes that are all placed on a slight forward reaching elevation that forms an extension of the clypeus (Karsch 1878). The cephalic area represents the highest part of the carapace.

The holotype of the type species of *Acroaspis*, *A. olorina* Karsch, 1878 (ZMB 1423; dry pinned, examined), was collected in Perth (Western Australia) ('Swan River') and putative males and females of the species have been identified in the Western Australian Museum pending a thorough revision of the genus at the species level.

The genus has not been treated taxonomically since its description and it is beyond the scope of this study to provide detailed synapomophies of *Acroaspis* without treating its diverse fauna in Australia, but the examination of male and female genitalia of many *Acroaspis* males and females in Australian collections representing more than 20 species allows a preliminary characterisation of its genitalic and somatic characters in addition to the characteristic shape of the cephalothorax of the female as described by Karsch (1878).

The male pedipalp has a single patella spine and a distinct, spoon-shaped paramedian apophysis. The median apophysis is elongated, often with a fleshy protrusion at about half its length, and a curved tip that is armed with two lobes (Fig. 1B). The base of the median apophysis forms an arch over the radix as is common in Australian 'Backobourkiines' (*sensu* Scharff et al. in press). The female epigyne generally has a triangular base plate with a scape that originates anteriorly and is narrow triangular (Figs 2C, D). This scape is often broken off in females (Fig. 2D). The abdomen invariably has humeral and posterior humps (Figs 2A, E), but it is also regularly drawn out into a high turret (Fig. 1A; also Framenau et al. 2014, p. 160). The shape and colour of the abdomen appears to display high intraspecific variation (unpublished data).

In addition to the type species, two other species are currently listed in *Acroaspis*: *Acroaspis tuberculifera* Thorell, 1881 from northern Queensland, placed in the genus when originally described and not examined for the current study, and *A. decorosa* (Urquhart, 1894) from New Zealand, transferred to the genus by Framenau et al. (2010a) also based on the genus-level characteristics as listed above.

Acroaspis lancearia (Keyserling, 1887), comb. n.

Fig. 1A, B

Epeira lancearia Keyserling, 1887: 157–158, pl. 13, figs 3, 3a, 3b.
Araneus lancearius (Keyserling). Simon 1895: 804, Rainbow 1911: 188, Bonnet 1955: 527.

Type material. Holotype of *Epeira lancearia* Keyserling, 1887: male, Sydney [33°53'S, 151°13'E, New South Wales, AUSTRALIA), Museum Godeffroy (ZMH Rack (1961)-catalog 247) (examined).

Remarks. The holotype male of *Epeira lancearia* displays the typical features of *Acroaspis* as detailed above, including the genus-specific characters of the male pedipalp (Fig. 1B) and the elevated abdomen (Fig. 1A). The species is therefore here transferred to *Acroaspis*, *A. lancearia* (Keyserling, 1887), comb. n.

Acroaspis mamillana (Keyserling, 1887), comb. n.

Fig. 2A, C

Epeira mamillana Keyserling, 1887: 154–155, pl. 12, figs 8, 8a, 8b.
Araneus mamillanus (Keyserling). Rainbow 1911: 189; Bonnet 1955: 533.

Type material. Syntypes of *Epeira mamillana* Keyserling, 1887: 3 females, Sydney [33°53'S, 151°13'E, New South Wales, AUSTRALIA), Museum Godeffroy (ZMH Rack (1961)-catalog 251); 2 females, same data (BMNH 1890.7.1.4151–2) (all examined).

Remarks. The syntype females of *Epeira mamillana* agree with the genus-specific characterisation as detailed above, including the characteristic shape of the carapace and humeral and posterior humps of the abdomen (Fig. 2A) and the morphology of the epigyne (Figs 2B, C). The species is therefore transferred to *Acroaspis*, *A. mamillana* (Keyserling, 1887), comb. n.

Acroaspis scutifer (Keyserling, 1886), comb. n.

Fig. 2D, F

Epeira scutifera Keyserling, 1886: 152–153, pl. 12, figs 7, 7a.
Araneus scutiferus (Keyserling). Rainbow 1911: 192.
Araneus scutifer (Keyserling). Bonnet 1955: 592.

Type material. Holotype of *Epeira scutifera* Keyserling, 1887: female, Sydney [33°53'S, 151°13'E, New South Wales, AUSTRALIA), Museum Godeffroy (ZMH Rack (1961)-catalog 271) (examined).

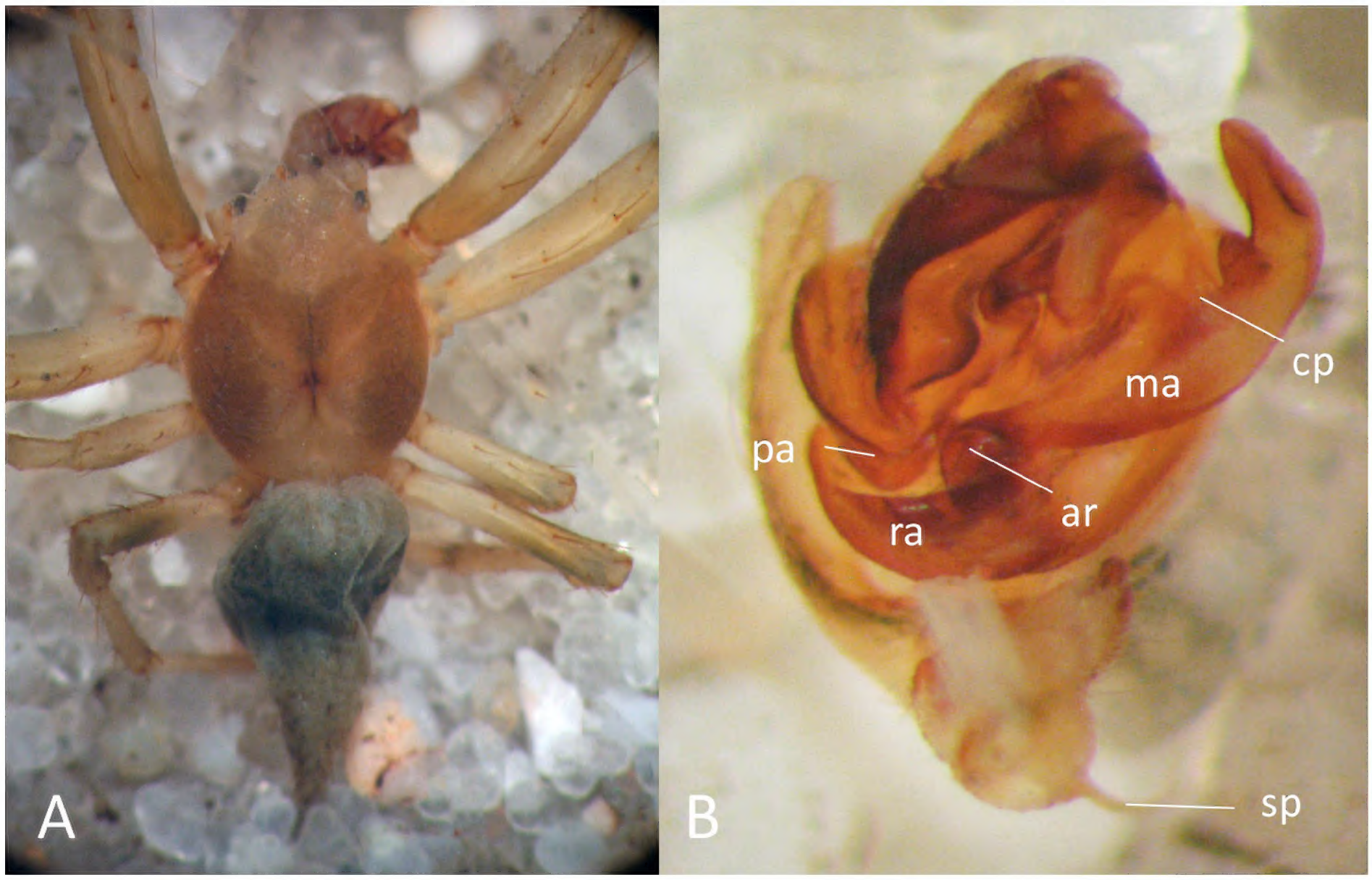

Figure 1. *Acroaspis lancearia* (Keyserling, 1887), comb. n., holotype male (ZMH 247). **A**, habitus, dorsal view; **B**, pedipalp, ventral view. Abbreviations: ar – basal arch of median apophysis, cp – fleshy central protrusion of median apophysis, ma – median apophysis, pa – paramedian apophysis, ra – radix, sp – patellar spine.

Remarks. The female holotype of *Epeira scutifera* clearly shows the somatic and genitalic characters that are here considered characteristic for the genus, in particular the shape of the carapace and the shape of the epigyne (Figs 2D–F). Therefore, I here transfer the species to *Acroaspis*, *Acroaspis scutifer* (Keyserling, 1887), comb. n.

The specific epithet is not an adjective, but derived from the Latin masculine noun (*scutifer* – squire, armiger), and therefore Keyserling's (1887) '*scutifera*' was correctly adjusted to *scutifer* by Bonnet (1955).

Carepalxis L. Koch, 1872

The genus *Carepalxis* was erected by L. Koch (1872) based on the description of a female of *C. montifera* L. Koch, 1872 collected at Port Mackay, Queensland. Currently, the genus includes twelve species world-wide, including seven species from Australia, three from the Americas and two from New Guinea (World Spider Catalog 2019). Levi (1991b) revised the genus for the Americas based on females only, as the only males known at the time were those of the Australian *C. tuberculata* Keyserling, 1886 lodged in the MNHN as reported by Simon (1896). The genus is diagnosed by two distinct humps in the cephalic region; males have one macroseta on the pedipalp patella, the pedipalp gnathoxae have a tooth and the first coxae a corresponding hook. The second tibia has a characteristic branched tipped with two macrosetae (Levi 1991b). This armature of the second leg of the male is similar to that of *Verrucosa*, a genus otherwise mainly known from the Nearctic (World Spider Catalog 2019). It therefore does no surprise, that Archer (1951a), in a review of araneid genera, placed an Australian representative of *Carepalxis* in *Verrucosa* based solely on the original description of the male and without an examination of specimens. This generic misplacement is corrected here.

Carepalxis furcifera (Keyserling, 1886), comb. n.

Epeira furcifera Keyserling, 1886: 144–145, plate 12, figs 1, 1a.
Verrucosa furcifera (Keyserling). Archer 1951a: 20.

Types material. Holotype of *Epeira furcifera* Keyserling, 1886: male, Rockhampton [23°22'S, 150°30'E, Queensland, AUSTRALIA], Museum Godeffroy (ZMH Rack (1961)-catalog 239) (examined).

Remarks. The holotype male of *Epeira furcifera* clearly shows the somatic characters of *Carepalxis* as described by Levi (1991b), namely a domed carapace and two macrosetae on the tibia of the first leg. Unfortunately, the holotype is in poor condition and the pedipalps are missing, making a detailed evaluation of the genitalia impossible. However, the original description of the species by Keyserling (1886) clearly shows the typical, large C-shaped median apophysis of *Carepalxis* males

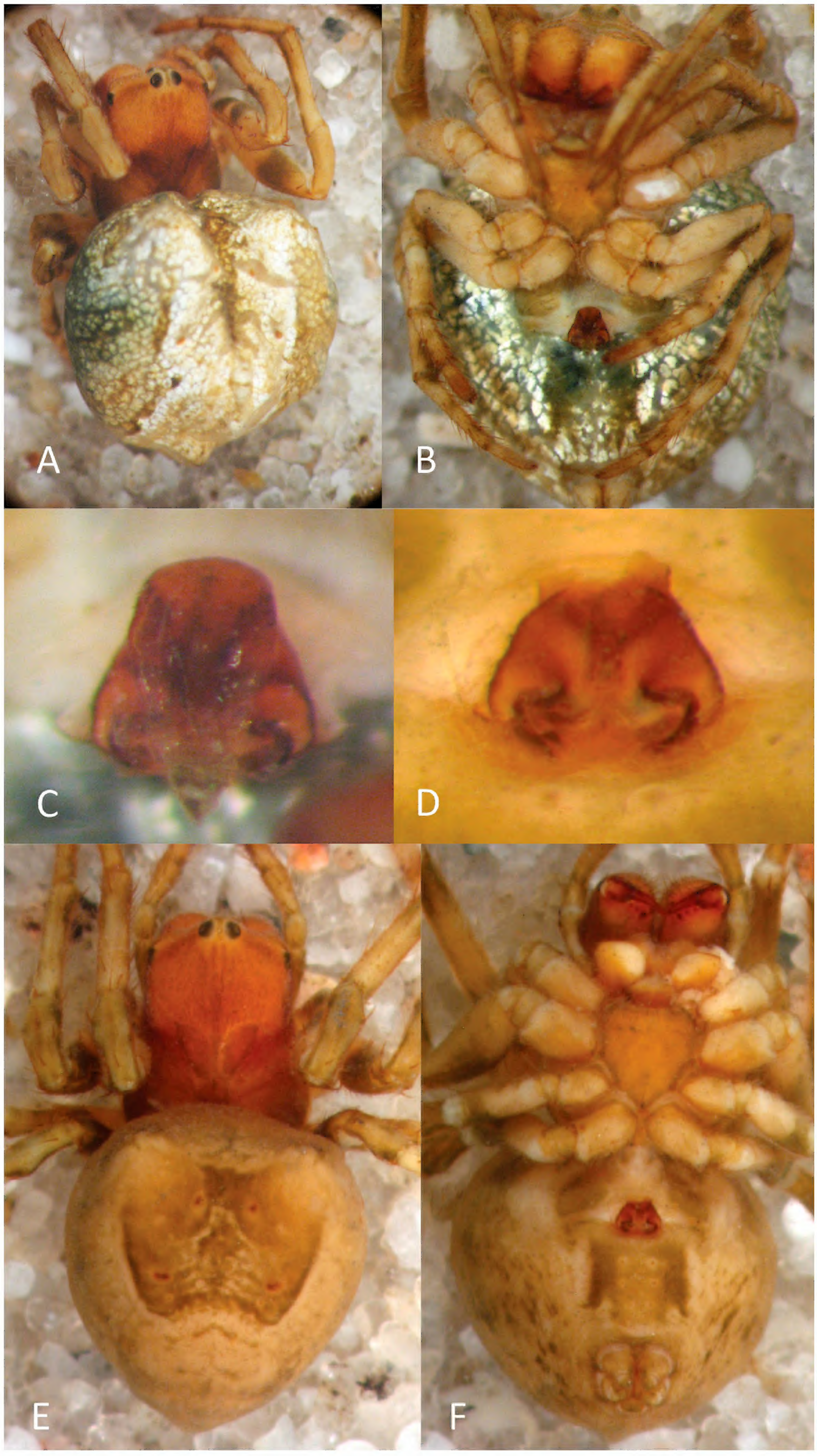

Figure 2. *Acroaspis mamillana* (Keyserling, 1887), comb. n., female syntype (ZMH 251) (**A–C**) and *Acroaspis scutifer* (Keyserling, 1886), comb. n., female holotype (ZMH 271) (**D–F**). **A, E,** habitus dorsal view; **E, G,** habitus, ventral view; **C, D,** epigyne, ventral view.

as examined in many Australian specimens (unpublished data). Due to the lack of genitalia, it may not be possible to accurately identify this species pending a revision of *Carepalxis* for Australia. This will depend on a detailed evaluation of somatic characters in the genus and its diversity in the Rockhampton area, the type locality of *E. furcifera*. Based on the distinctive somatic features as listed above, I here transfer the species to *Carepalxis*, *Carepalxis furcifera* (Keyserling, 1886), comb. n.

Cyclosa Menge, 1866

Parazygia Caporiacco, 1955: 345 (synonymy established in Levi (1977, p. 73)).

Cyclosa is a large orb-weaving spider genus with currently over 170 species with a world-wide distribution (World Spider Catalog 2019). Nine species are currently listed from Australia; however, the taxonomy of the genus is poorly resolved in this country and in particular two species, *C. fuliginata* (L. Koch, 1872) and *C. rhombocephala* (Thorell, 1881) are clearly misplaced as they bear little resemblance to the genus as reviewed outside the Australian context (Levi 1977; 1999). Both likely require the erection of new genera as suggested by molecular data at least for *C. fuliginata* (Scharff et al. in press).

At the genus level, *Cyclosa* is well circumscribed. Revisions or reviews are available for a number of geographic areas, including the Americas (Levi 1977; 1999), India (Keswani 2013), and some Asian countries (e.g. Petcharad et al. 2014; Tanikawa and Ono 1993; Yin et al. 1997). The genus is easily characterised (Davies 1988; Levi 1999) by having: a characteristic carapace shape that differs between males and females (in males it is flat and the cephalic region is less than half the width of the thoracic region, in females, the cephalic region is separated from the thoracic region by a distinct V-shaped grove); posterior median eyes with a full canoe-shaped tapetum; the presence of a paramedian apophysis in the male pedipalp; the pedipalp bulb being usually wider than long, with a large conductor holding the embolus in a rim and the base of the median apophysis close to the conductor; the abdomen with one to three posterior conical projections and generally reaching beyond the spinnerets.

Cyclosa species generally build small orb-webs with linear web decorations that incorporate undigested prey items. In some species this web decoration has been suggested to function primarily as camouflage to conceal the spider from insects rather than as prey attractant (e.g. Tan and Li 2009).

The unique morphology of *Cyclosa* facilitates referring a number of Australian species that are currently misplaced in *Araneus* and *Carepalxis* to the genus.

Cyclosa anatipes (Keyserling, 1887), comb. n.

Epeira anatipes Keyserling, 1887: 175–177, plate 15, figs 3, 3a, 4, 4a.

Aranea anatipes (Keyserling). Roewer 1942: 824.

Araneus anatipes (Keyserling). Bonnet 1955: 432; Rainbow 1911: 182; Rainbow 1916a: 111.

Type material. Syntypes of *Epeira anatipes* Keyserling, 1887: 2 females, 1 juvenile, labelled "Australia" [no exact locality given, AUSTRALIA] (BMNH 1890.7.1.4152–4); 3 males, 2 females, Peak Downs [22°56'S, 148°05'E, Queensland, AUSTRALIA], Museum Godeffroy (ZMH Rack (1961)-catalog 220); 1 male, 1 female, 1 juvenile, Rockhampton [23°22'S, 150°30'E, Queensland, AUSTRALIA], Museum Godeffroy (ZMH Rack (1961)-catalog 220); 4 females, 1 juvenile, Palau [no exact locality, PALAU], Museum Godeffroy (ZMH Rack (1961)-catalog 220) (all examined).

Remarks. The examination of the syntypes of *Epeira anatipes* clearly show that this species conforms to the diagnosis of *Cyclosa* due to the shape of the cephalothorax and male and female genitalia. This species has close affinities to *Cyclosa insulana* (Costa, 1834) as illustrated in Levi (1977) and might be its junior synonym. Pending a revision of *Cyclosa* in the Australasian/Oriental regions, I propose the transfer of this species to *Cyclosa*, *Cyclosa anatipes* (Keyserling, 1887), comb. n.

Cyclosa apoblepta (Rainbow, 1916), comb. n.

Fig. 3A–E

Araneus apobleptus Rainbow, 1916a: 112–114, plate 22, figs 32–37; Bonnet 1955: 438.

Aranea apoblepta Rainbow. Roewer 1942: 824.

Type material. Syntypes of *Araneus apobleptus* Rainbow, 1916: 2 & 4 males, 5 & 5 females of two different species (see below), [17°05'S, 145°46'E, Queensland, AUSTRALIA], May–July in 1912 and 1913; "from orbicular webs, and males chiefly by sweeping in forest and jungle. Two exemplars were taken from the window of a dwelling" (Rainbow 1916b, p. 114) (AM KS6507) (examined).

Remarks. The examination of the syntypes of *Araneus apobleptus* clearly showed that these specimens belong to the genus *Cyclosa* due to the shape of the cephalothorax and male and female genitalia. However, the type material represents two different species. Four of the 6 males and 5 of the 10 females (now separated from each other in the vial in the collection of the AM) very closely resemble *C. insulana* as illustrated in Levi (1977) (see Fig. 3A–E), whereas the remaining specimens have a distinctly different genital morphology. It is beyond the scope of this study to elucidate the true identity of the syntypes of *Araneus apobleptus*, which requires a comprehensive revision of the Australian/Oriental *Cyclosa* and the designation of a lectotype for the species. As part of this review, I propose the transfer of this species to *Cyclosa*, *Cyclosa apoblepta* (Rainbow, 1916), comb. n. to facilitate the consideration of this species in a future treatment of the genus.

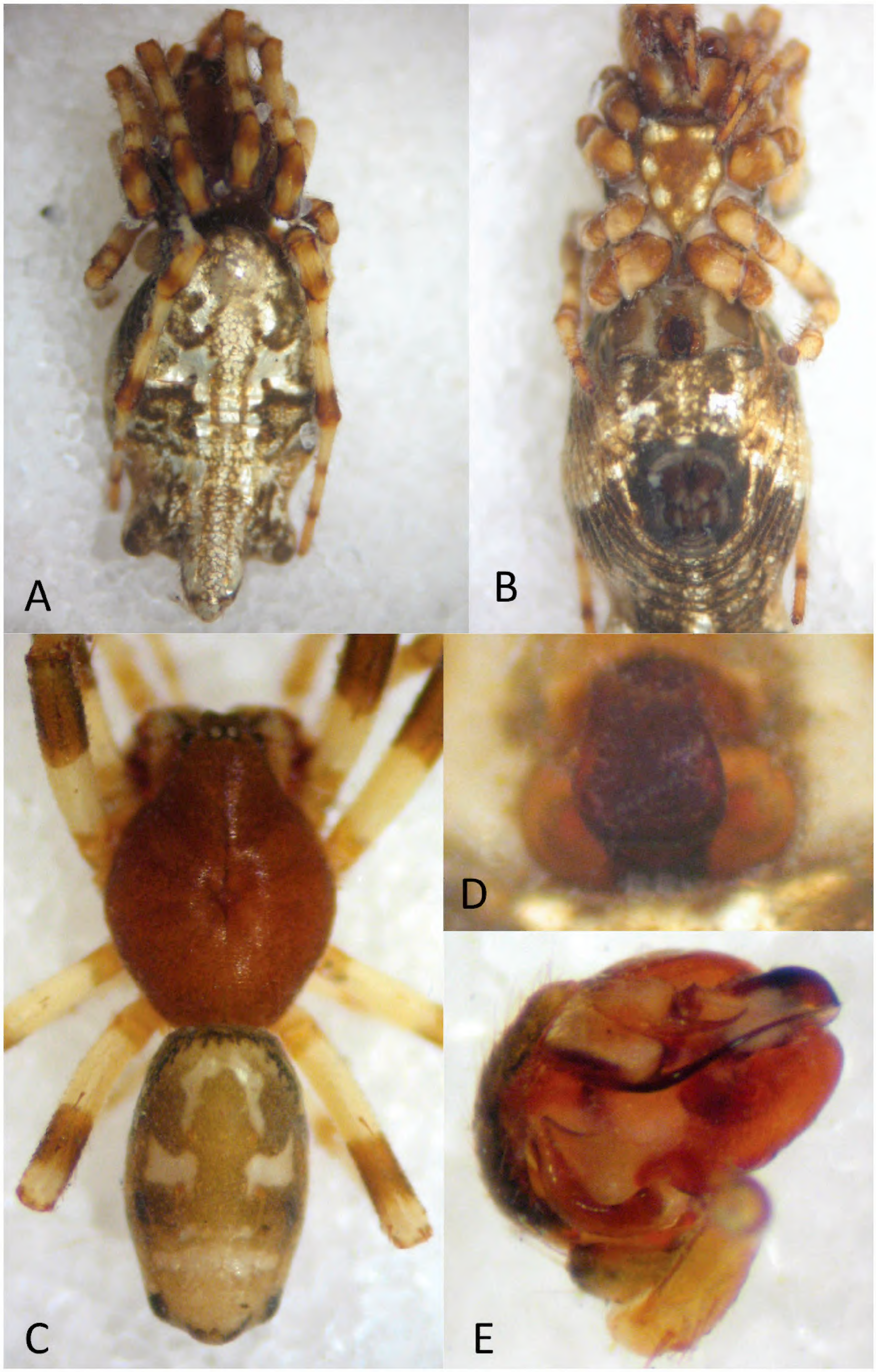

Figure 3. *Cyclosa apoblepta* (Rainbow, 1916), comb. n., female and male syntypes (AM KS6507). **A, B,** female, dorsal and ventral view; **C,** dorsal view of male; **D,** epigyne, ventral view; **E,** male pedipalp, ventral view.

Cyclosa argentaria (Rainbow, 1916), comb. n.

Araneus argentarius Rainbow, 1916a: 114, plate 22, figs 38–39; Bonnet 1955: 438.
Aranea argentaria Rainbow: Roewer 1942: 824.

Type material. Syntypes of *Araneus argentarius* Rainbow, 1916: 2 immature females, Gordonvale [17°05'S, 145°46'E, Queensland, AUSTRALIA], 30 August 1912; "from nests in low forest" (Rainbow 1916: 114) (AM KS6508) (examined).

Remarks. The examination of the immature syntypes of *Araneus argentarius* clearly shows that these specimens belong to the genus *Cyclosa* due to the shape of the cephalothorax and abdominal humps. Both specimens are immature and only a comprehensive revision of Australasian *Cyclosa* may allow elucidating their true identity and relationships to *C. insulana* and *C. apoblepta* comb. n. As part of this study, I propose a transfer of this species to *Cyclosa*, *Cyclosa argentaria* (Rainbow, 1916), comb. n.

Cyclosa lichensis (Rainbow, 1916), comb. n.

Fig. 4A, B

Carepalxis lichensis Rainbow, 1916a: 115–116, plate 22, figs 40–42; Bonnet 1956: 954.

Type material. Holotype of *Carepalxis lichensis* Rainbow, 1916: 1 female with three eggsacs, Gordonvale [17°05'S, 145°46'E, Queensland, AUSTRALIA], 30 May 1913; "forest" (Rainbow 1916: 114) (AM KS8882) (examined).

Remarks. It appears that Rainbow (1916a) placed this species in *Carepalxis* based on the shape of the abdomen (Fig. 4A). An examination of the holotype female of *Carepalxis lichensis*, however, shows that this species belongs to the genus *Cyclosa* based on the distinct shape of the cephalothorax and genital morphology (Figs 4A–B). It is closely related to *C. mulmeinensis* (Thorell, 1887) and *C. vallata* (Keyserling, 1886), both illustrated, for example, in Tanikawa (2007) and Chrysanthus (1961; 1971). It might be a junior synonym of either pending a detailed revision of the Australasian species of *Cyclosa*. Here, I propose the transfer of the species to *Cyclosa*, *Cyclosa lichensis* (Rainbow, 1916), comb. n.

Cyclosa poweri (Rainbow, 1916), comb. n.

Fig. 4C, D

Carepalxis poweri Rainbow, 1916b: 61, fig. 4; Bonnet 1956, p. 954.

Type material. Holotype of *Carepalxis poweri* Rainbow, 1916: 1 female, Narrabeen [33°43'S, 152°17'E, New South Wales, AUSTRALIA], Chas. D. Power (AM KS8881) (examined).

Remarks. An examination of the female holotype clearly indicated that *Carepalxis poweri* belongs to the genus *Cyclosa*, based on the distinctive shape of the carapace with its V-shaped constriction (Fig. 4C, D; (see also Rainbow 1916b; fig. 4). Similar to *C. lichensis*, the species resembles *C. mulmeinensis* or *C. vallata* and may be a junior synonym of either, pending a comprehensive revision of Australian *Cyclosa*. It is here transferred to *Cyclosa* to facilitate such a revision, *Cyclosa poweri* (Rainbow, 1916), comb. n.

Neoscona Simon, 1864

Afraranea Archer, 1951a: 21 (synonymy established in Grasshoff (1986, p. 4).
Chinestela Chamberlin, 1924: 20 (synonymy established in Archer (1958, p. 17).
Cubanella Franganillo, 1926: 54–56 (synonymy established in Franganillo (1936, p. 76).

With more than 110 species and subspecies, *Neoscona* belongs to one of the most diverse orb-weaving spider genera world-wide (World Spider Catalog 2019). The genus was comprehensively revised for North America (Berman and Levi 1971; Levi 1993) and the Africotropical region (Grasshoff 1986) where the authors provided detailed diagnoses and descriptions for the genus and all species. Members of *Neoscona* are readily recognised by male and female genitalic characters, such as the large size of the basal haematodocha of the male pedipalp which only leaves a small part of the bulb for the genital sclerites (Levi 1993). The median apophysis of the male pedipalp is of characteristic shape with a proximal, recurved tooth (but see Grasshoff 1986 for the subgenus *Afraranea*). Females have a characteristic, spatula-shaped epigyne of variable length (e.g. Levi 1993). The abdomen often has a characteristic folium pattern dorsally. Generic transfers of species to *Neoscona* below are based on the presence of these diagnostic features. *Neoscona* occurs throughout all biogeographic regions but appears to be most diverse in the Oriental, Australian and Pacific regions. All currently recognised Australian representatives have strong links with the Oriental fauna and none of the species seems to be an Australian endemic pending a comprehensive revision of the Australasian *Neoscona* fauna.

Neoscona decolor (L. Koch, 1871), comb. n.

Fig. 5A–C

Epeira decolor L. Koch, 1871: 71–72, pl. 6, figs 8, 8a; Hasselt 1882: 21.
Araneus decolor (L. Koch). Hogg 1900: 74; Rainbow 1911: 184.
Aranea decolor (L. Koch). Roewer 1942: 826.

Type material. Holotype of *Epeira decolor* L. Koch, 1871: 1 female, "Viti Inseln" (= REPUBLIC OF FIJI) [no exact locality], Museum Godeffroy 7554 (ZMH Rack (1961)-catalog no. 234) (examined).

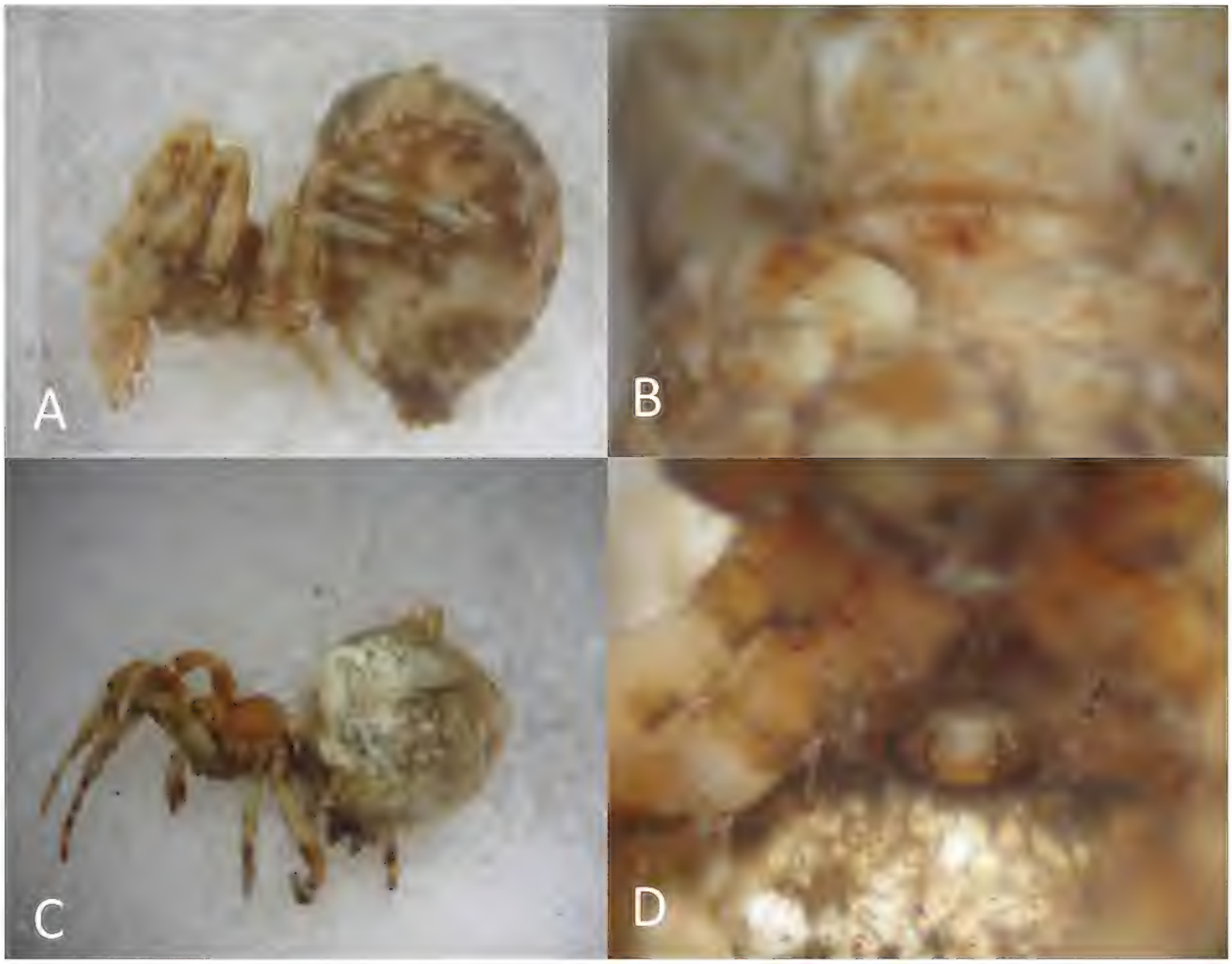

Figure 4. *Cyclosa lichensis* (Rainbow, 1916), comb. n., female holotype (AM KS8882) (AB) and *Cyclosa poweri* (Rainbow, 1916), comb. n., female holotype (AM KS8881) (C–D). A, C, habitus, lateral view; B, D, epigyne, ventral view.

Remarks. The holotype female of *Epeira decolor* is bleached but somatic characters (Figs 5A, B) and the spatula-shaped epigyne (Fig. 5C) clearly identify this species as *Neoscona*. Consequently, I propose the transfer of this species to this genus, *Neoscona decolor* (L. Koch, 1871), comb. n.

Neoscona decolor comb. n. was originally described from the Republic of Fiji (Koch 1871). Hasselt (1882) listed this species, with a question mark, from Padang (West Sumatra, Indonesia). Hogg (1900) firstly listed it for Australia (Macedon district, Victoria) and it was therefore recorded by Rainbow (1911) in his catalogue of Australian spiders. However, I could not find Hogg's specimen in the BMNH, where it is expected to be housed, to confirm this record. It remains doubtful that a spider originally described from a tropical island state in the Pacific also occurs isolated in the temperate climate of south-eastern Australia. No *Neoscona* species has so far been found in Victoria in any of the collections investigated, including the Museum Victoria in Melbourne (unpublished data). The southern-most record of the genus is from ca. 35°S Latitude, south of Sydney (New South Wales). Therefore, the historic Australian record of this species must be considered very doubtful and is likely based on a misidentification.

Neoscona enucleata (Karsch, 1879), comb. n.

Epeira enucleata Karsch, 1879: 550.
Epeira albertisii Thorell, 1887: 182 (synonymy established in Thorell (1895)).
Epeira soronis Thorell, 1890: 143–146 (synonymy established in Thorell (1895)).
Araneus soronis (Thorell). Simon 1899: 91.
Araneus enucleatus (Karsch). Bonnet 1955: 500.

Type material. Holotype of *Epeira enucleata* Karsch, 1879: 1 female, Ceylon (= Sri Lanka) [no exact locality], Nietner (ZMB 3074) (examined).

Holotype of *Epeira albertisii* Thorell, 1887: 1 female, Mawlamyine (formerly Mulmein or Moulmein) (16 29 N, 97 37 E, Mon State, MYANMAR)], O. Beccari & E. D'Albertis (possibly MCSN, not examined).

Syntypes of *Epeira soronis* Thorell, 1890a: 2 females, Sumatra [no exact locality given, INDONESIA], coll. Forbes (possibly MCSN, not examined).

Remarks. Thorell (1895) himself established the synonymy of *Epeira enucleata* with both his *E. albertisii* and *E. soronis*. Curiously, Sherriffs (1929, p. 234) later discussed the morphology of *Araneus albertisii* as a valid

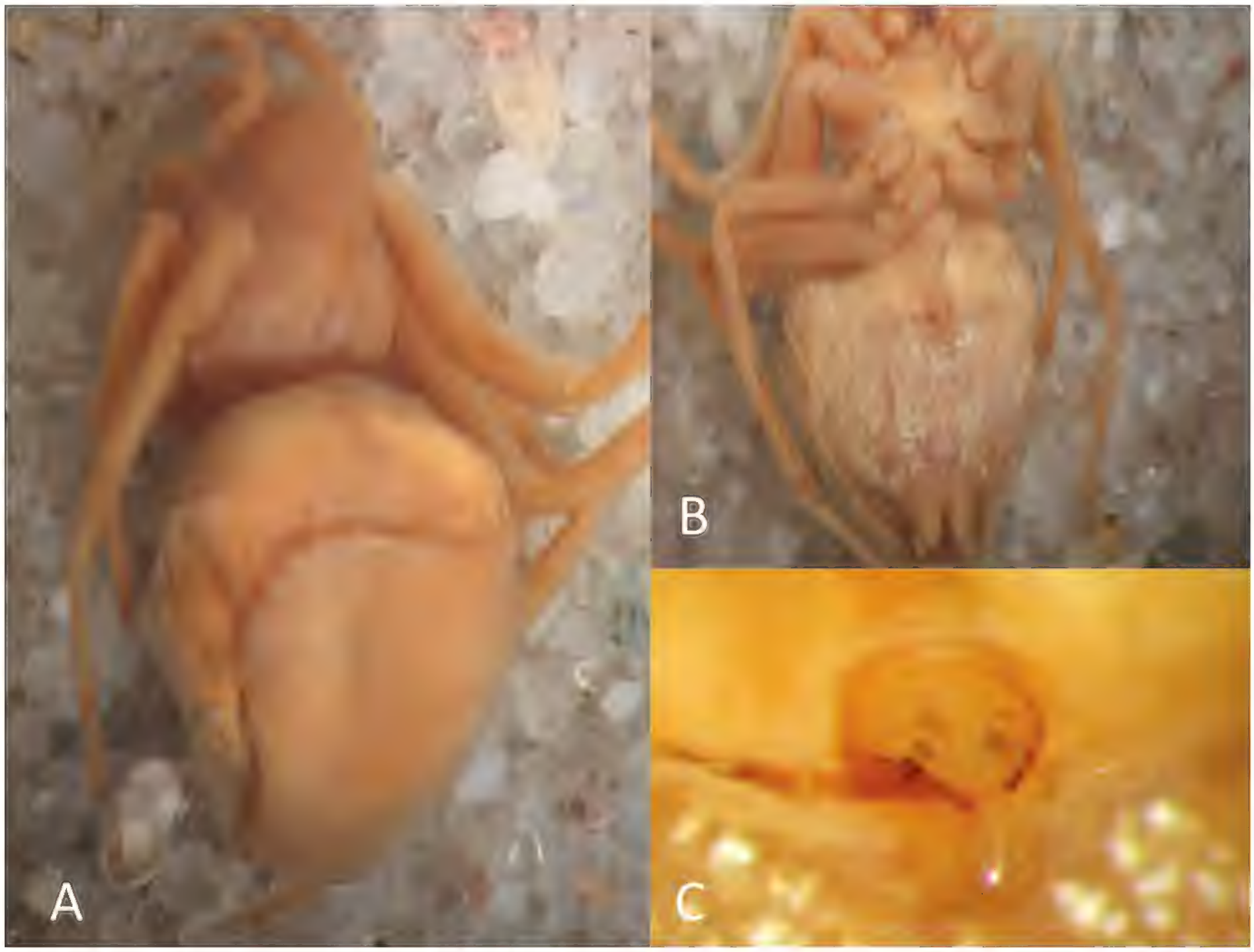

Figure 5. *Neoscona decolor* (Hogg, 1914), comb. n., female holotype (ZMH 234). **A,** habitus, dorsal view; **B,** habitus, ventral view; **C,** epigyne, ventral view.

species in the same publication in which he listed in a table (p. 237): "34. *enucleata* (Karsch), 1879=*albertisii* (Thorell). Burma, Cylon" and two pages later (p. 239): "117. *soronis* (Thor.), 1890=*enucleata* (Karsch)."

The examination of the holotype of *Epeira enucleata* and specimens identified by Thorell as *Epeira albertisii* from Myanmar (Tonghoe, Tharawaddy) (seen in BMNH) and collected by E. W. Oates support a placement of this species in *Neoscona*. In particular, the scape of the female epigyne has the typical shape of *Neoscona*. A placement in *Neoscona* is also suggested by Sheriffs (1929) who states close similarities of *A. albertisii* with *N. rumpfi* (Pocock 1900) (= *Neoscona vigilans* (Blackwall 1865)), and by Thorell (1895) who compares *E. enucleata* with *E. hispida* Doleschall, 1859 (= *Neoscona vigilans*) (World Spider Catalog 2019).

Neoscona flavopunctata (L. Koch, 1871), comb. n.

Fig. 6A–D

Epeira flavopunctata L. Koch, 1871: 79–80, plate 5, figs 4, 4a; Hasselt 1882: 20.
Aranea flavopunctata (L. Koch). Roewer 1942: 828.
Araneus flavopunctulatus (L. Koch). Bonnet 1955: 503 (misspelled).

Type material. Holotype of *Epeira flavopunctata* L. Koch, 1871: 1 male, "Viti Inseln" (= REPUBLIC OF FIJI) [no exact locality], Museum Godeffroy 3837 (ZMH Rack (1961)-catalog no. 238) (examined).

Remarks. Somatic characters (Figs 6A, B) and pedipalp morphology (Figs 6C, D) of the male holotype of *Epeira flavopunctata* clearly identify this species as a *Neoscona*. Due to the shape of the median apophysis (lacking a median spine) this species belongs the subgenus *Afraranea sensu* Grasshoff (1986). *Neoscona flavopunctata* comb. n. was originally described from Fiji. Hasselt (1882) recorded it from Silago (Southern Leyte, Philippines).

Neoscona floriata (Hogg, 1914), comb. n.

Fig. 7A–D

Araneus floriatus Hogg, 1914: 57. Hogg 1915: 446–448, figs 25, 25a–d; Bonnet 1955: 504.
Aranea floricata Hogg. Roewer 1942: 828 (misspelled).

Figure 6. *Neoscona flavopunctata* (L. Koch, 1871), comb. n., male holotype (ZMH 238). **A,** habitus, dorsal view; **B,** habitus, ventral, view; **C,** pedipalp, mesal view; **D,** pedipalp, retrolateral view.

Type material. Syntypes of *Araneus floriatus* Hogg, 1914: 1 female, 2 juveniles, neighbourhood of the Setakwa and Utakwa Rivers, [no exact locality given, West Papua, INDONESIA], 1912, Wollaston Expedition, H30 (BMNH 1921.3.24.37–38) (examined).

Remarks. In his initial description Hogg (1914) listed two female and one male syntype of *Araneus floriatus*. Curiously, his later, more elaborate description (Hogg 1915) omits the male and lists one mature female and one immature female. The vial here considered to contain

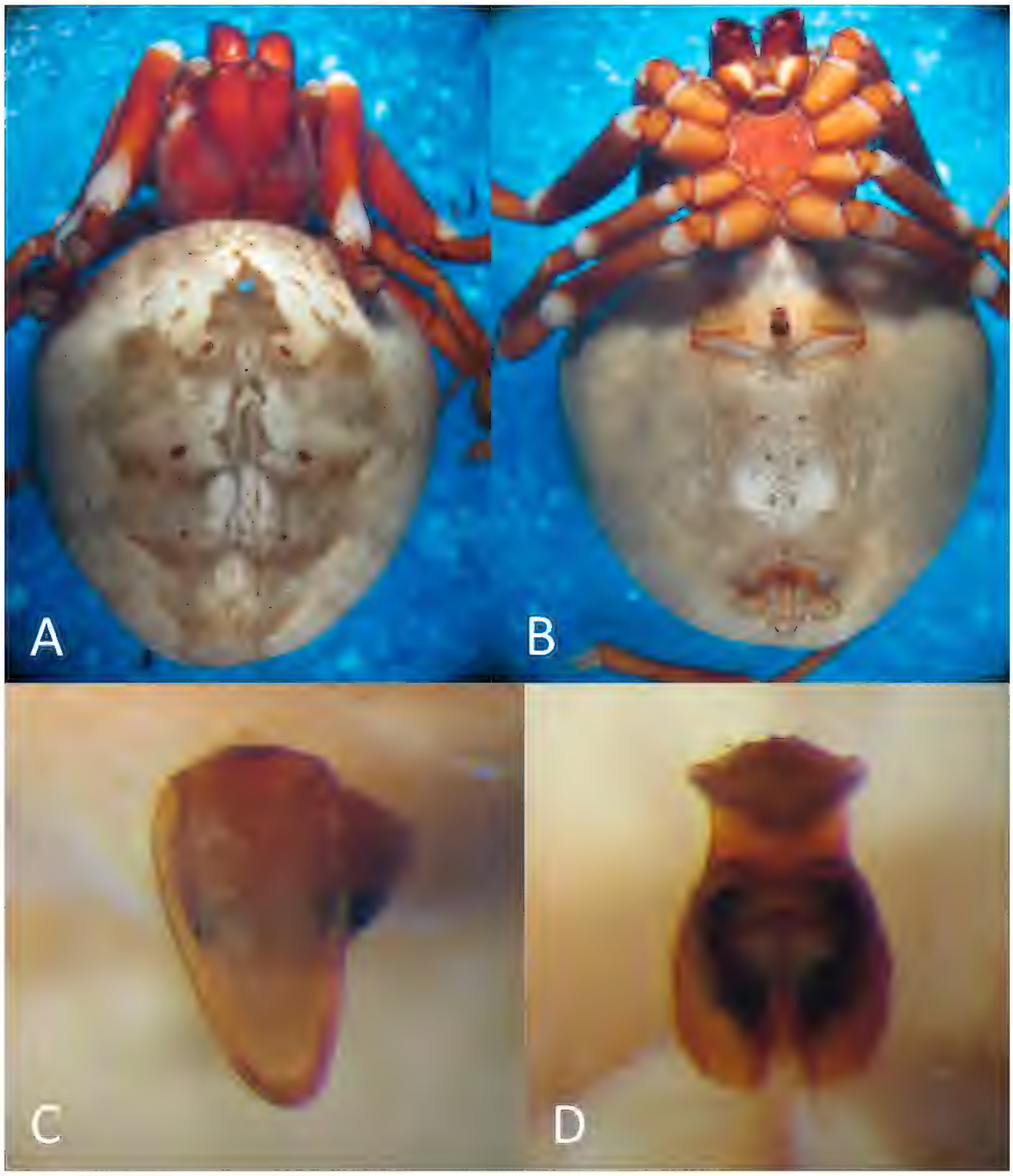

Figure 7. *Neoscona floriata* (Hogg, 1914), comb. n., female syntype (BMNH 1921.3.24.37). **A,** habitus, dorsal view; **B,** habitus, ventral view; **C,** epigyne, ventral view; **D,** epigyne, posterior view.

the type material contains one female, one juvenile and a third spider (lacking an epigyne if female), but no male.

The epigyne of the female syntype (Figs 7C, D) conforms to the subgenus *Afraranea* sensu Grasshoff (1986). Hogg (1914) discusses similarities of this species with *Araneus ferrugineus* (Thorell, 1877) and *Araneus pfeifferae* (Thorell, 1877), both of which should therefore also be considered in a future revision of Oriental *Neoscona*. I have not been able to examine the types of these species, presumably housed in the MCSN.

Neoscona granti (Hogg, 1914), comb. n.

Fig. 8A–C

Araneus granti Hogg, 1914: 57. Hogg 1915: 448–450, figs 26, 26a–b; Bonnet 1955: 510; Chrysanthus 1960: 36, figs 32–33, 49, 60, 72.

Aranea granti Hogg. Roewer 1942: 828.

Type material. Holotype of *Araneus granti* Hogg, 1914: female, neighbourhood of the Setakwa and Utakwa Rivers, [no exact locality given, West Papua, INDONESIA], Wollaston Expedition (BMNH 1921.3.24.166) (examined).

Remarks. The holotype female of *Araneus granti*, including its somatic (Figs 8A, B) and genitalic (Fig. 8C) characters, conform to the circumscription of the genus *Neoscona* above. The proposed placement in *Neoscona* is also confirmed by Hogg's (1915) discussion, who places the species close to *Araneus vatius* (Thorell 1877), today a junior synonym of *Neoscona punctigera* (Doleschall 1857). Chrysanthus (1960) subsequently reported and

Figure 8. *Neoscona granti* (Hogg, 1914), comb. n., female holotype (BMNH 1921.3.24.166). **A,** habitus, dorsal view; **B,** habitus, ventral view; **C,** epigyne, ventral view.

illustrated *Araneus granti* males and females (and other species of *Araneus* today listed in *Neoscona*) from West Papua and his illustrations also show the typical characters of *Neoscona*. Here, this species is transferred to *Neoscona*, *N. granti* (Hogg, 1914), comb. n.

Neoscona inusta (L. Koch, 1871), comb. n.

Epeira inusta L. Koch, 1871: 94–95, plate 7, figs 3, 3a–b.
Epeira weyersi Simon, 1885: 38 (synonymy established in Thorell (1870)).
Araneus inustus (L. Koch). Simon 1895: 813; Rainbow 1911: 187; Bonnet 1955: 522; Chrysanthus 1960: 41–42, figs 52, 59, 67–68, 48; Yin et al. 1997: 138, figs 53a–c; Song et al. 1999: 239, figs 138F–G, 148F.

Type material. Holotype of *Epeira inusta* L. Koch, 1871: 1 female, Bowen (Port Denisson) [20°00'S, 148°14'E, AUSTRALIA] Museum Godeffroy (depository unknown).

Remarks. The holotype female of *Epeira inusta* was not found in the collections of the BMNH, ZMH or ZMB where most specimens of the Godeffroy Museum are expected to be housed. The BMNH purchased parts of the collection of L. Koch and has a female identified by L. Koch as *Epeira inusta* (BMNH 1915.3.5.781, examined); however, this female is labelled Gayndah (Queensland), not Bowen and it is unlikely the missing holotype. A further two females from Rockhampton (Queensland) were part of Keyserling's collection (BMNH 1890.7.1.4121.2, examined) but neither can be the missing type. However, there is no doubt about the identity of this species which is not only very common along the east-coast of Aus-

tralia (unpublished data), but also occurs in eastern and south-eastern Asia (Barrion and Litsinger 1995; Chrysanthus 1960; 1971; Song et al. 1999).

I have examined many males and females of this species. It is clearly misplaced in *Araneus*. Somatic and genitalic characters (in particular the female epigyne and male pedipalp, e.g. the shape of the median apophysis) (see Chrysanthus 1960) clearly place this species in *Neoscona*: *Neoscona inusta* (L. Koch, 1871), comb. n. Chrysanthus (1960) flagged a potential synonym of *N. inusta* with *Araneus gestroi* (Thorell, 1881) described from Papua New Guinea which should be further investigated in a review of Australian and South-East Asian *Neoscona*.

Neoscona notanda (Rainbow, 1912), comb. n.

Araneus notandus Rainbow, 1912: 196, figs 7–9; Bonnet 1955: 554.
Aranea notanda Rainbow. Roewer 1942: 830.

Type material. Holotype of *Araneus notandus* Rainbow, 1912: 1 female, Blackall Range [26°37'S, 152°52'E, Queensland, AUSTRALIA], C. J. Wild (QM W2122) (examined).

Remarks. This species is closely related to *Neoscona inusta* comb. n. The epigyne scape of the holotype of *Araneus notandus* is short and spatula-shaped, but some variation, in particular a different course of the fertilisation duct that shines through the scape suggest it to be a different species. A series from Sabai Island (Queensland) in the QM contains five males of this species (in addition to 6 females and 10 immatures) that also confirm it as *Neoscona* based on the structure of the male pedipalp as reviewed in Grasshoff (1986). I therefore propose its transfer to *Neoscona*, *Neoscona notanda* (Rainbow, 1912), comb. n.

Theridiidae Sundevall, 1833
Anelosimus Simon, 1891

Anelosimus dianiphus (Rainbow, 1916), comb. n.

Araneus dianiphus Rainbow, 1916a: 106–107, plate 22, figs 22–25, Bonnet 1955: 497.
Aranea dianipha Rainbow: Roewer 1942: 827.

Type material. Syntypes of *Araneus dianiphus* Rainbow, 1916: female, Gordonvale [17°05'S, 145°46'E, Queensland, AUSTRALIA], 29 May 1913; "sweeping, forest, top of coastal range, 1,500ft." (Rainbow 1916a, p. 107) (AM KS6515) (examined). Male, same collection data (depository unknown).

Remarks. The examination of the syntype female of *A. dianiphus* showed this species to belong to the family Theridiidae. Consultation with specialists working on Australian Theridiidae suggested a placement in *Anelosimus* based on somatic and genitalic characters (I. Agnarsson, H. Smith personal communication). Therefore, I propose the new generic placement *Anelosimus dianiphus* (Rainbow, 1916), comb. n. within the spider family Theridiidae pending a generic revision of Australian comb-footed spiders.

Both male and female syntypes of *A. dianiphus* were recorded in the old, handwritten register of the Australian Museum. The male apparently had disappeared by the time the types were first registered on computer in the 1980s. The original label in the vial of the syntype female mentions only the female, so presumably both syntypes were originally in separate vials. The whereabouts of the male syntype is currently unknown (H. Smith, personal communication).

It is curious to note that Rainbow (1916a), in the same publication that he described *Araneus dianiphus*, also described a theridiid with the same specific epithet, *Theridion dianiphum* Rainbow, 1916. Should both species, after a revision of the Australia theridiid fauna, show to be congeneric, a replacement name for one of the species needs to be found.

Theridion Walckenaer, 1805

Theridion xanthostichum (Rainbow, 1916), comb. n.

Araneus dianiphus xanthostichus Rainbow, 1916a: 107, plate 22, fig. 26.
Aranea dianipha xanthosticha Rainbow. Roewer 1942: 827.
Araneus dianiphus var. *xanthostichus* Rainbow. Bonnet 1955: 497.

Type material. Holotype of *Araneus dianiphus xanthostichus* Rainbow, 1916: female, Gordonvale [17°05'S, 145°46'E, Queensland, AUSTRALIA], 3 September 1912; "forest, from folded leaf" (Rainbow 1916a, p. 107) (AM KS6514) (examined).

Remarks. Similar to *A. dianiphus*, examination of the holotype of *Araneus dianiphus xanthostichus* showed it to be a theridiid spider. It is more difficult to place this species in a currently recognised genus within the Theridiidae (I. Agnarsson, personal communication). It is clearly not conspecific and likely not congeneric with *A. dianiphus* comb. n. (see above). Somatic and genitalic characters suggest a placement in or near *Theridion* (Walckenaer 1805). Therefore, I propose to elevate the species from subspecies to species status, *Theridion xanthostichum* (Rainbow, 1916), stat. & comb. n. within the spider family Theridiidae, pending a revision of the Australian theridiid fauna.

Nomina dubia
Immature or damaged type material

Araneus acachmenus Rainbow, 1916

Araneus acachmenus Rainbow, 1916a: 98–99, plate 21, figs 14–15. Bonnet 1955: 419.
Aranea acachmena Rainbow. Roewer 1942: 823.

Type material. Holotype of *Araneus acachmenus* Rainbow, 1616: penultimate female, Gordonvale [17°05'S,

145°46', Queensland, AUSTRALIA], November 1913 (AM KS6505) (examined).

Remarks. The holotype of *Araneus acachmenus* is a penultimate female with close affinities to Australian Araneidae currently listed in *Eriophora*, i.e. *E. transmarina* (Keyserling 1865) and *E. biapicata* (L. Koch, 1871). Species in this group are somatically very similar and impossible to identify accurately without an investigation of fully developed male or female genitalia (e.g. Davies 1980). As more than one species in this group occurs at the type locality of *A. acachmenus*, Gordonvale (Queensland), the species is here considered a *nomen dubium*.

Araneus agastus Rainbow, 1916

Fig. 9A, B

Araneus agastus Rainbow, 1916a: 104–106, pl. 22, figs 20–21.

Type material. Holotype of *Araneus agastus* Rainbow, 1916: Penultimate female, Gordonvale [17°05'S, 145°46'E, Queensland, AUSTRALIA], 22 August 1912, "taken from web in front of window of dwelling" (Rainbow 1916a) (AM KS6506) (examined).

Remarks. The holotype female of *Araneus agastus* (Figs 9A, B) is a penultimate female and cannot be identified at the species level. The species may be a junior synonym of *Backobourkia heroine* (L. Koch, 1871) or *B. brounii* (Urquhart 1885), but this cannot be ascertained. Therefore, the species-group name *A. agastus* is here proposed a *nomen dubium*.

Araneus exsertus Rainbow, 1904

Fig. 9C, D

Araneus exsertus Rainbow, 1904: 28–29, figs 26–27.

Type material. Holotype of *Araneus exsertus* Rainbow, 1904: immature female, Mornington Island (16 36'S, 139 21'E, Queensland, AUSTRALIA), Mr. Chas Hedley (AM KS6516) (examined).

Remarks. The abdomen of the holotype of *Araneus exsertus* is characteristically extended with numerous humps (Figs 9C, D), suggesting an identification could be possible based on somatic characters alone. However, my investigations of Australian araneids revealed this abdomen shape to be shared by a number of species with extended distributions that include the type locality of *A. exsertus*. Therefore, species-level identification of this species is not possible and I consider it a *nomen dubium*.

Araneus suavis Rainbow, 1899

Araneus suavis Rainbow, 1899b: 308–309, plate 24, figs 2, 2a. Bonnet 1955: 607.
Aranea suavis Rainbow. Roewer 1942: 834.

Type material. Holotype of *Araneus suavis* Rainbow, 1899: female (abdomen missing), Nendo (Nitendi, Santa Cruz) [ca. 10°25'S, 165°30'E, SOLOMON ISLANDS] (AM KS6524) (examined).

Remarks. The abdomen of the female holotype of *Araneus suavis* is missing and it is doubtful that it will be possible to accurately identify this species by somatic features of the cephalothorax alone. The original description suggests this species may belong to *Neoscona*, however, the illustration of the epigyne is stylised. Therefore, I consider the species-group name *Araneus suavis* a *nomen dubium*.

Carepalxis coronata (Rainbow, 1896)

Fig. 10A

Epeira coronata Rainbow, 1896b: 629–630, plate. 49, fig. 1.
Carepalxis coronata (Rainbow). Rainbow 1909: 225; Rainbow 1911: 197; Bonnet 1956: 954.

Type material. Holotype of *Epeira coronata* Rainbow, 1896: immature female, New England [no exact locality, New South Wales, AUSTRALIA], A.M. Lea (AM KS8683) (examined).

Remarks. The holotype of *Epeira coronata* is immature and of unknown sex and does not allow an accurate species identification. Although the transfer to *Carepalxis* appears to correctly reflect the somatic characters of this specimen, i.e. the two-humped carapace (Fig. 10A), the genus is with at least 10 mainly undescribed species (unpublished data) too diverse in eastern Australia to allow associating mature spiders with it. Consequently, I consider *Carepalxis coronata* a *nomen dubium*.

Heurodes Keyserling, 1886

Simonarachne Archer, 1951b: 28 (synonymy established in Archer (1958, p. 14)).

Heurodes was established based on a juvenile spider from Sydney. Keyserling (1886, p. 116) alerted to similarities with *Epeira* Walckenaer 1805 (today a junior synonym of *Araneus*), but stressed differences in the spineless legs, high clypeus and the broad cephalic region. The genus was subsequently treated by Archer (1951a; b; 1958) and Yaginuma and Archer (1959), the latter describing genital characters although no mature spider had been associated with the type species at the time. These characters likely referred to specimens of *Simonarachne* Archer, 1951 (type species: *Eriovixia laglaizei* (Simon 1877)) (later considered a junior synonym of *Heurodes*) or *Eriovixia* Archer, 1951, considered a junior synonym of *Heurodes* by Yaginuma and Archer (1959). However, the latter synonymy was not accepted by Grasshoff (1986, p. 118) who listed *Eriovixia* as separate genus.

A male and female of *H. turritus* was illustrated by Davies (1988), however without elaborating on where the depicted specimens were found and without justification of their species identity.

Figure 9. *Araneus agastus* Rainbow, 1916, holotype, immature (AM KS6506) **(A–B)** and *Araneus exsertus* Rainbow, 1904, holotype, immature (AM KS6516) **(C–D)**. **A, C,** habitus, dorsal view; **B, D,** habitus, ventral view. Both species are here considered *nomina dubia*.

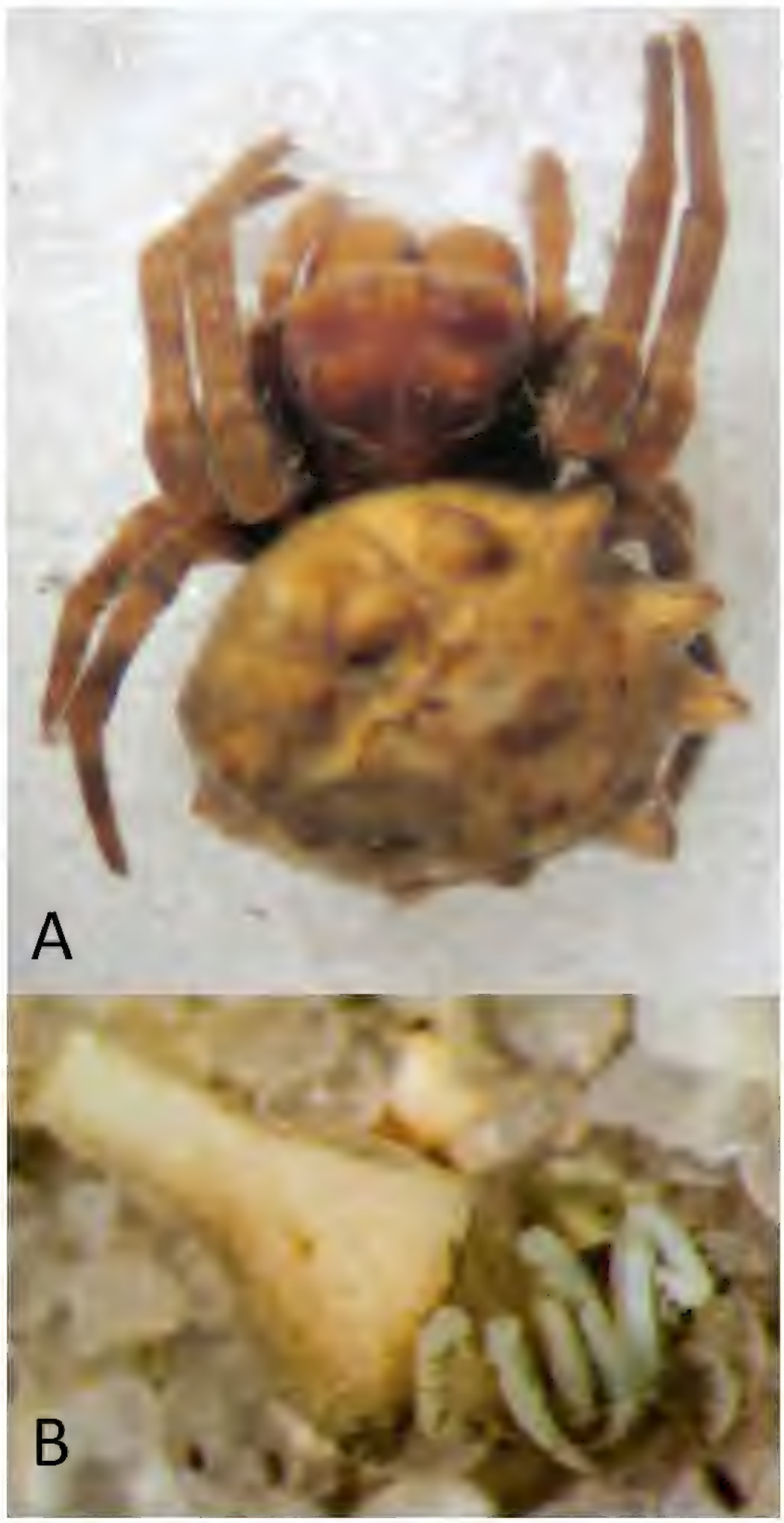

Figure 10. *Epeira coronata* Rainbow, 1896, holotype, immature (AM KS8683) **(A)** and *Heurodes turritus* Keyserling, 1886, holotype, immature (ZMH 384) **(B)**. **A,** habitus, dorsal view; **B,** habitus, lateral view. Both species are here considered *nomina dubia*.

Within an Australian context it is likely that *Heurodes* is a junior synonym of *Acroaspis*, also characterised by a high clypeus and with many species that show a similar elevated abdomen as *H. turritus* (see above) (unpublished data). Consequently, Davies' (1988) illustrations of *H. turritus* are consistent with the characterisation of *Acroaspis* as detailed above. However, as *Acroaspis* includes at least 20 species in Australia (unpublished data), it is not possible to identify *H. turritus* at the species level.

With the unidentifiable type species of *Heurodes* and a likely junior synonymy of the genus with *Acroaspis*, it seems most pragmatic to consider the species-group name *Heurodes turritus* and therefore also the genus-group name *Heurodes nomina dubia*.

In addition to the type species, *H. turritus* from Australia, two other species are currently listed in the genus and now require consideration at the genus level: *H. fratrellus* (Chamberlin, 1924), originally described based on an immature female from China, and *H. porculus* (Simon, 1877), known currently only from females and initially described from the Philippines and later reported from Singapore (Workman 1896).

Heurodes porculus is here returned to *Eriovixia*, where it was previously placed by Archer (1951a; 1958), *E. porcula* (Simon, 1877) comb. reval. Similarly, *Eriovixia pseudocentrodes* (Bösenberg & Strand, 1906) had temporarily been transferred to *Heurodes* by Yaginuma and Archer (1959).

Heurodes fratrellus is here considered a *nomen dubium*. The type specimen is apparently a juvenile (Chamberlin, 1924, p. 19 "*one not fully mature female*") and it was subsequently considered unidentifiable (Song et al. 1999).

Heurodes turritus Keyserling, 1886

Fig. 10B

Heurodes turrita Keyserling, 1886: 116–118, pl. 9, fig. 3.
Rainbow 1911: 196; Davies 1988: 300, fig. 25.
Araneus turrita (Keyserling). Simon 1895: 820.

Type material. Holotype of *Heurodes turritus* Keyserling, 1886: immature, Sydney [33°53'S, 151°13'E, New South Wales, AUSTRALIA), 'e. Mus. God.; det. Keyserling' (ZMH Rack (1961)-catalog 384) (examined).

Remarks. The type specimen of *H. turritus* is a juvenile collected in Sydney, New South Wales. It has a distinctly elevated abdomen (Fig. 10B) and based on this feature the genus was previously associated with *Eriovixia*. However, there are a number of species in south-eastern Australia with such elevated abdomen and currently referred to *Acroaspis* (e.g. Framenau et al. 2014). It is therefore impossible to identify *H. turritus* and the species is here considered *nomen dubium*. As *H. turritus* is the type species of *Heurodes*, this also renders the genus-group name *Heurodes* a *nomen dubium*.

Type material lost

Araneus Clerck, 1757

Araneus crinitus (Rainbow, 1893)

Anepsia crinita Rainbow, 1893: 23–24, pl. 3, figs 5, 5a.
Araneus crinitus (Rainbow). Simon 1895: 869; Rainbow 1911: 184; Bonnet 1955: 471.
Aranea crinita (Rainbow). Roewer 1942: 826.

Type material. Holotype of *Anepsia crinita* Rainbow, 1893: immature (?) female, Manly [33°48'S, 151°17'E, New South Wales, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype of *Anepsia crinita* is not present in the Australian Museum and must be considered lost. The original description of this species does not include an illustration of the epigyne nor are female genitalia mentioned anywhere in the text in contrast to all other species described in the same publication. Rainbow (1893) may therefore have described an immature specimen. Simon (1895) did not believe the species to belong to the genus *Anepsion* Strand, 1929 and based on its description considered it a 'normal *Araneus*'. It will not be possible to identify this species from the description alone and therefore I consider the species-group name *Anepsia crinita* a *nomen dubium*.

Araneus diabrosis (Walckenaer, 1841)

Epeira diabrosis Walckenaer, 1841: 131–132; L. Koch 1871: 116.
Araneus diobris (Walckenaer). Rainbow 1911: 185 (misspelled).

Type material. Holotype of *Epeira diabrosis* Walckenaer, 1841: male, Port Jackson (Sydney) [33°50'S, 151°16'E, New South Wales, AUSTRALIA], J. R. C. Quoy and J. P. Gaimard collection (considered lost).

Remarks. The original description of the male of *Epeira diabrosis* placed the species in a group with *Eriophora pustulosa* (Walckenaer, 1841), in Walckenaer's (1841) family of 'Irregulares'–i.e. the abdomen has tubercles–and within the race 'Triangularae truncatae', a triangular anteriorly truncated (not rounded) abdomen that is drawn out posteriorly by tubercles into a triangle. However, in contrast to *E. pustulosa* (which has five posterior humps) (e.g. Court and Forster 1988), *Epeira diabrosis* was described to have only a single posterior tubercle in addition to distinct humeral humps (Walckenaer 1841). Within the Australian context, this description is most consistent with a new genus represented by *C. fuliginata*; however, a number of species of this genus are present in New South Wales (unpublished data) and it is unlikely that the species can be recognised by the short verbal original description alone. Therefore, I consider the species-group name *Epeira diabrosis* a *nomen dubium*.

Araneus diversicolor (Rainbow, 1893)

Epeira diversicolor Rainbow, 1893: 16–18, plate. 3, figs 1, 1a–b.
Araneus diversicolor (Rainbow). Rainbow 1911: 185; Bonnet 1955: 498.
Aranea diversicolor (Rainbow). Roewer 1942: 827.

Type material. Holotype of *Epeira diversicolor* Rainbow, 1893: female, Sydney [33°53'S, 151°13'E, New South Wales, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype female *Epeira diversicolor* is not present in the collection of the AM and must be considered lost. The original description of this species, in particular the shape of the epigyne, suggests this species to belong to *Cyrtophora* Simon, 1864. Taking into account the diversity of this genus in eastern Australia (e.g. Framenau 2008; Framenau and Scharff 2009) it is unlikely that this species can be identified confidently. Therefore, I consider the species-group name *Epeira diversicolor* a *nomen dubium*.

Araneus fictus (Rainbow, 1896)

Epeira ficta Rainbow, 1896a: 323–324, pl. 18, figs 2, 2a.
Araneus fictus (Rainbow). Rainbow 1911: 186; Bonnet 1955: 502.
Aranea ficta (Rainbow). Roewer 1942: 827.

Type material. Holotype of *Epeira ficta* Rainbow, 1896: female, New England district [no exact locality, New South Wales, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype female of *Epeira ficta* is not present in the AM and must be considered lost. The original description suggests close affinities with *Araneus psittacinus* (Keyserling, 1887) and *Araneus ginninderranus* Dondale, 1966, both of which can only be separated by detailed examination of the genitalia. As this is not possible due to the lost type, I consider *Epeira ficta* a *nomen dubium*.

Araneus hamiltoni (Rainbow, 1893)

Epeira hamiltoni Rainbow, 1893: 21–23, plate 3, figs 7, 7a.
Araneus hamiltoni (Rainbow). Rainbow 1911: 186; Bonnet 1955: 516.
Aranea hamiltoni (Rainbow). Roewer 1942: 828.

Type material. Holotype of *Epeira hamiltoni* Rainbow, 1893: female, Guntawang, near Mudgee [32°23'S, 149°29'E, New South Wales, AUSTRALIA], A.G. Hamilton (whereabouts unknown).

Remarks. The holotype female of *Epeira hamiltoni* is not present in the Australian Museum and must be considered lost. The original stylised description of the epigyne suggests close affinities with *Araneus lodicula* (Keyserling, 1887), *Araneus brisbanae* (L. Koch, 1867) or *Araneus lutulentus* (Keyserling, 1886), none of which are true *Araneus* (see Scharff et al. in press). With the presumed loss of the type it is not possible to accurately identify this species and I consider it a *nomen dubium*.

Araneus lacrymosus (Walckenaer, 1841)

Epeira lacrymosa Walckenaer, 1841: 34–35.
Epeira lacrimosa Walckenaer. L. Koch, 1871: 83.
Araneus lacrymosus (Walckenaer). Rainbow 1911: 188.

Type material. Holotype of *Epeira lacrymosa* Walckenaer, 1841: sex/life stage not given, Port Jackson (Sydney) [33°50'S, 151°16'E, New South Wales, AUSTRALIA], J. R. C. Quoy and J. P. Gaimard collection (considered lost).

Remarks. The original description of *A. lacrymosus* does not allow an accurate identification of this species. Based on this description, L. Koch (1871) keyed *A. lacrymosus* to a diverse, clearly paraphyletic group of orb-weaving spiders that also does not allow an interpretation of its morphological affinities: *Cyrtophora cordiformis* (L. Koch, 1871), *Neoscona punctigera* (as *Epeira indagatrix* L. Koch, 1871), *Araneus flavopunctata* (L. Koch, 1871) (from Fiji; currently unknown affinities) and *Araneus speculabundus* (L. Koch, 1871) (representing a new genus of Australian orb-weaving spiders; unpublished data). Considering the diversity of Australian orb-weaving spiders, it is unlikely that the true identity of *A. lacrymosus* will be revealed without examining the holotype. I therefore consider the species-group name *Epeira lacrymosa* a *nomen dubium*.

Araneus leai (Rainbow, 1894)

Epeira leai Rainbow, 1894: 287–289, plate 10, fig. 1.
Araneus leai (Rainbow). Rainbow 1911: 188; Bonnet 1955: 527.
Aranea leai (Rainbow). Roewer 1942: 829.

Type material. Holotype of *Epeira leai* Rainbow, 1894: female, Bungendore [35°14'S, 149°127E, New South Wales, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype female of *Epeira leai* is not present in the AM and must be considered lost. The original description suggests this species to belong to *Neoscona*, but the rudimentary description of the epigyne (Rainbow 1894, p. 289: "Epigyne a short blunt process") does not allow to associate this species with any known *Neoscona* from New South Wales. Therefore, I consider *Epeira leai* a *nomen dubium*.

Araneus mortoni (Urquhart, 1891)

Epeira mortoni Urquhart, 1891: 236–237, fig. 1.
Aranea mortoni (Urquhart). Roewer 1942: 830.

Type material. Holotype of *Epeira mortoni* Urquhart, 1891: female, Tasmania [no exact locality, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype female of *Epeira mortoni* seems be lost. The description suggests close affinities with either *Plebs eburnus* or *P. bradleyi* (Keyserling, 1887) (both of which, in addition to a *P. patricius* Joseph & Framenau, 2012, occur in Tasmania (Joseph and Framenau 2012)), but neither of these species can be confirmed as a synonym of *A. mortoni* with certainty. In addition, none of the copies of the volume that I was able to study contained the figure plate, which, as figure 1, was supposed to show the epigyne of this species. Not being able to undoubtedly identify this species based on the original description alone, I consider the species-group name *Epeira mortoni* a *nomen dubium*.

Araneus notacephalus (Urquhart, 1891)

Epeira notacephala Urquhart, 1891: 239–240.
Aranea notacephala (Urquhart). Roewer 1942: 830.

Type material. Syntypes of *Epeira notacephala* Urquhart, 1891: "several examples" (females), Tasmania [no exact locality, AUSTRALIA] (whereabouts unknown).

Remarks. The syntypes of *Epeira notacephala* appear to be lost. The original descriptions suggest close affinities with possibly *Araneus arenaceus* (Keyserling, 1886). However, there are several undescribed species within this group in south-eastern Australia (unpublished data) and it is not possible to identify *Epeira notacephala* based on the original description alone. I therefore consider this species-group name a *nomen dubium*.

Araneus obscurtus (Urquhart, 1893)

Epeira obscurta Urquhart, 1893: 116–117.
Araneus obstructus (Urquhart). Rainbow 1911: 190 (misspelled)
Aranea obscurata (Urquhart). Roewer 1942: 830 (misspelled).
Araneus obscuratus (Urquhart). Bonnet 1955: 554 (misspelled).

Type material. Holotype of *Epeira obscurta* Urquhart, 1893: female, Tasmania [no exact locality, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype female of *Epeira obscurta* seems to be lost. Similar to *A. diabrosis*, *A. singularis* (Urquhart, 1891) and *A. viridulus* (Urquhart, 1891) (see below for the latter two species), this species appears to have affinities to *E. pustulosa.* Taking the diversity of this group in south-eastern Australian into account, it appears very unlikely that the identity of this species can be elucidated based on the original description alone. I therefore consider the species-group name *Epeira obscurta* a *nomen dubium*.

Araneus phaleratus (Urquhart, 1893)

Epeira phalerata Urquhart, 1893: 114–116.
Araneus phaleratus (Urquhart). Rainbow 1911: 190; Bonnet 1955: 566.
Aranea phalerata (Urquhart). Roewer 1942: 831.

Type material. Holotype of *Epeira phalerata* Urquhart, 1893: female, Tasmania [no exact locality, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype of *Epeira phalerata* seems to be lost. I am not able to associate any orb-weaving spider from Tasmania with the description given by Urquhart (1893) and it is doubtful that it will be possible to identify this species based on that description alone. I therefore consider *Epeira phalerata* a *nomen dubium*.

Araneus pronubus (Rainbow, 1894)

Epeira pronuba Rainbow, 1894: 289–290, plate 10, figs 2, 2a–d.
Araneus pronubus (Rainbow). Rainbow 1911: 191; Bonnet 1955: 570.
Aranea pronuba (Rainbow). Roewer 1942: 831.

Type material. Holotype of *Epeira pronuba* Rainbow, 1894: female, Bungendore [35°14'S, 149°127E, New South Wales, AUSTRALIA] (whereabouts unknown).

Remarks. The female holotype of *Epeira pronuba* is not present at the AM and must be considered lost. The original description suggests close affinities with *Larinia* Simon, 1874 or species associated with *Araneus talipedatus* (Keyserling, 1887). However, the epigyne is not illustrated and the short verbal description (Rainbow 1894, p. 290: "Epigyne a short blunt dark process directed forwards") does not allow an accurate identification of this species. Therefore, I consider the species-group name *Epeira pronuba* a *nomen dubium*.

Araneus rarus (Keyserling, 1887)

Epeira rara Keyserling, 1887: 193–194, plate 17, figs 2, 2a.
Araneus rarus (Keyserling). Hogg 1900: 74; Rainbow 1911: 192; Bonnet 1955: 581.

Type material. Holotype of *Epeira rara* Keyserling, 1887: male, Cape York [ca. 15°00'S, 143°00'E, Queensland, AUSTRALIA], Bradley Collection (whereabouts unknown).

Remarks. As other types from the Bradley collection, the male holotype of *Epeira rara* should be considered lost. Keyserling (1887) described two araneid species based on males from the Bradley collection, *Araneus rarus* and *Araneus mulierarius* (Keyserling, 1887). Whereas the latter can be identified based on the original description (and is congeneric with *Araneus dimidiatus* (L. Koch, 1871) in a new genus of Australian orb-weavers; see Scharff et al. in press), the description and illustrations of the former do not allow a species identification against material from northern Queensland as investigated primarily in the Queensland Museum. I therefore consider the species-group name *Epeira rara* a *nomen dubium*. The uncommented listing of *A. rarus* from Victoria (Hogg 1900) cannot be confirmed.

Araneus singularis (Urquhart, 1891)

Epeira singulara Urquhart, 1891: 240–242, fig. 2.
Aranea singulara (Urquhart). Roewer 1942: 833.

Type material. Holotype of *Epeira singulara* Urquhart, 1891: female, Tasmania [no exact locality, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype of *Epeira singulara* seems to be lost. The original description suggests affinities with *E. pustulosa* (Urquhart 1891, p. 242: "posterior tubercles [of abdomen], 5; first row slightly developed; tubercle of second row most prominent"). Plate 1 with figure 2 of the

epigyne of this species was not present in the copies of Urquhart's (1891) volume that were available to me and may never have been published. Despite postulated unique "remarkable irregular metallic markings on the abdomen" it is not possible to undoubtedly identify this species. I therefore consider *Epeira singulara* a *nomen dubium*.

Araneus subflavidus (Urquhart, 1893)

Epeira sub-flavida Urquhart, 1893: 117–119.
Araneus sub-flavidus (Urquhart). Rainbow 1911: 193.
Aranea subflavida (Urquhart). Roewer 1942: 834.
Araneus subflavidus (Urquhart). Bonnet 1955: 607.

Type material. Holotype of *Epeira sub-flavida* Urquhart, 1893: female, Tasmania [no exact locality, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype female of *Epeira sub-flavida* seems to be lost. The original description suggests a large orb-weaving spider, possibly with affinities to *Eriophora biapicata* or *Backobourkia heroine*. Taking the diversity of these large spiders in south-eastern Australia into account, it is unlikely that this species can be identified by the original description alone, and therefore I consider the species-group name *Epeira sub-flavida* a *nomen dubium*.

Araneus urquharti (Roewer, 1942)

Epeira similaris Rainbow, 1896a: 324, plate 18, fig. 3 (preoccupied by *Epeira similaris* Urquhart, 1891).
Aranea urquharti Roewer, 1942: 835 (replacement name for *Epeira similaris* Rainbow, 1896).
Araneus similaris (Rainbow). Bonnet 1955: 599; Rainbow 1911: 193.

Types. Holotype of *Epeira similaris* Rainbow, 1896: female, New England district [no exact locality, New South Wales, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype female of *Epeira similaris* is not present at the AM and must be considered lost. The original species description (Rainbow 1896a) places this species in close affinity with *Araneus fictus* described in the same publication. For the same reasons as for that species (see above), I consider *Epeira similaris* a *nomen dubium*.

Araneus ventriosus (Urquhart, 1891)

Epeira ventriosa Urquhart, 1891: 237–239.
Aranea ventriosa (Urquhart). Roewer 1942: 835.

Type material. Holotype of *Epeira ventriosa* Urquhart, 1891: female, Tasmania [no exact locality, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype of *Epeira ventriosa* seems to be lost. The original description, in particular of the epigyne (Urquhart 1891, p. 239: "long, tapering, flat, transversely rugose, hairy, yellowish scapus, curving backwards and upwards") suggests close affinities with *E. biapicata* or *B. heroine*. However, there are a number of very similar large araneids in south-eastern Australia and it is not possible to undoubtedly identify *Epeira ventriosa* from the description alone. Therefore, I consider this species-group name a *nomen dubium*.

Araneus viridulus (Urquhart, 1891)

Epeira viridula Urquhart, 1891: 242–244.
Aranea viridula (Urquhart). Roewer 1942: 835.

Type material. Holotype of *Epeira viridulus* Urquhart, 1891: female, Tasmania [no exact locality, AUSTRALIA] (whereabouts unknown).

Remarks. The holotype of *Epeira viridulus* seens to be lost. The original description suggests a species with close affinities to *E. pustulosa* (Urquhart 1891, p. 243: "posterior tubercles [of abdomen] well-developed, centre tubercle of first row much the largest and stoutest") which belongs to a fairly diverse group with at least three different species in Tasmania (unpublished data). The description of the epigyne suggests the holotype to be a penultimate female (Urquhart 1891, pp. 243–244: "Vulva pale yellowish-brown; represents a low, transverse, oval elevation, prolonged into a broad, tapering, flatly convex, close lying scapus, fore-end slightly segmented") and it does not seem to be possible to identify this species with certainty. Therefore, I consider the species-group name *Epeira viridula* a *nomen dubium*.

Collina Urquhart, 1891

The genus *Collina* was described based on the single female of the type species, *C. glabicira* Urquhart, 1891. This is currently the only species listed in the genus (World Spider Catalog 2019). The holotype of *C. glabicira* seens to be lost and the genus *Collina* has not been treated since its original description. It was omitted by Rainbow (1911) and Bonnet (1955). Urquhart's (1891) did not provide a differential diagnosis for the genus and his description (including the description of the type species, see below) could not be matched up with any orb-weaving spider examined from Tasmania.

Collina glabicira Urquhart, 1891

Collina glabicira Urquhart, 1891: 247–249, fig. 4 (figure not present in any copies examined).

Type material. Holotype of *Collina glabicira* Urquhart, 1891: Female, no exact locality, Tasmania, AUSTRALIA, Alex Morton (whereabouts unknown).

Remarks. The holotype female of *C. glabicira* could not be found during my extensive examinations of Australian collections and does not appear to be present in

the CMNZ where types of the A. T. Urquhart collection are lodged (Nicholls et al. 2000; Paquin et al. 2008). It was also not possible to unequivocally identify any of the orb-weaving spiders examined from Tasmania (or south-eastern mainland Australia) as *C. glabicira*. None of the printed or electronic copies of Urquhart (1891) that I examined contained fig. 4 supposedly illustrating the species and it is likely that the plate containing the figure was never printed. As it is not possible to identify the species based on the description alone, I consider the species-group name *C. glabicira* Urquhart, 1891 a *nomen dubium* which therefore also renders the genus-group name *Collina* Urquhart, 1891 a *nomen dubium*.

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